Senior Technical Safety Manager

Qualification Standard
Reference Guide

MAY 2007

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ACRONYMS	
AC	administrative control
ACGIH	American Conference of Governmental Industrial Hygienists
ACWP	actual cost of work performed
AEA	Atomic Energy Act
ALARA	as low as reasonably achievable
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
BCWP	budgeted cost of work performed
BCWS	budgeted of cost of work scheduled
BIO	basis for interim operation
CAIB	Columbia Accident Investigation Board
CAIRS	Computerized Accident/Incident Reporting System
CAS	cost accounting standard
CCE	continuing core expectation
CDP	critical detection point
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CM	configuration management
COOP	continuity of operations program
CPAF	cost-plus-award fee
CRD	contractor requirements document
CSO	cognizant Secretarial Officer
CTA	central technical authority
DBT	design basis threat
DEAR	Department of Energy Acquisition Regulations
DMD	directives management document
DNFSB	Defense Nuclear Facilities Safety Board
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOE-HDBK	DOE handbook
DOE-STD	DOE standard
DOL	U.S. Department of Labor
DOT	U.S. Department of Transportation
DPO	differing professional opinion
DSA	documented safety analysis
ECP	Employee Concerns Program
E&CF	events and causal factors
EM	environmental management
EMS	environmental management systems
EMT	emergency management team
EOC	Emergency Operations Center
EPA	Environmental Protection Agency

ACRONYMS	
EPCRA	Emergency Planning and Community Right-to-Know Act
EPI	emergency public information
ERAP	emergency readiness assurance plan
ERO	Emergency Response Organization
ES&H	environment, safety and health
FACA	Federal Advisory Committee Act
FAR	Federal Acquisition Regulation
FDO	Fee Determining Official
FEMA	Federal Emergency Management Administration
FEM	field element manager
FFCA	Federal Facilities Compliance Act
FHA	fire hazard analysis
FLP	Future Leaders Program
FPC	Federal preparedness circular
FR	facility representative
FRAs	functions, responsibilities, and authorities
FTCP	Federal Technical Capability Program
G&A	general and administrative
GOCO	government-owned, contractor-operated
GOGO	government-owned, government-operated
GS	general schedule
GSA	General Services Administration
HPI	human performance initiative
HQ	Headquarters
HRO	high-reliability organization
HSS	Office of Health, Safety and Security
IAEA	International Atomic Energy Agency
IBC	International Building Code
INPO	Institute of Nuclear Power Operations
IPABS	Integrated Planning and Budgeting System
ISM	Integrated Safety Management
ISMS	integrated safety management system
ISO	International Organization for Standardization
JIC	joint information center
LPSO	lead program Secretarial Office
M&O	management and operating
MC&A	material control and accountability
MCA	material condition and aging
MORT	Management Oversight and Risk Tree
MOA	memorandum of agreement
MOU	memorandum of understanding
MOX	mixed oxide

ACRONYMS	
NARA	National Archives and Records Administration
NCO	NEPA compliance officer
NCRP	National Council on Radiation Protection and Measurements
NDAA	National Defense Authorization Act
NES	Nuclear Explosive Safety
NEPA	National Environmental Policy Act
NEWS	Nuclear Explosive Weapons Surety
NFPA	National Fire Protection Association
NIMS	National Incident Management System
NMMSS	Nuclear Materials Management and Safeguards System
NNSA	National Nuclear Security Administration
NPH	natural phenomena hazards
NRC	Nuclear Regulatory Commission
NTC	National Training Center
OMB	Office of Management and Budget
OPM	Office of Personnel Management
ORPS	Occurrence Reporting and Processing System
ORR	operational readiness review
OSHA	Occupational Safety and Health Administration
P2	Pollution Prevention
PAAA	Price-Anderson Amendments Act
PDSA	preliminary documented safety analysis
PER	performance evaluation report
PISA	potential inadequacy of the safety analysis
PPA	Pollution Prevention Act
PPBE/E	Planning, Programming, Budgeting and Execution/Evaluation
PSO	program Secretarial Officer
QA	Quality Assurance
QAP	quality assurance program
RA	readiness assessment
RCRA	Resource Conservation and Recovery Act
RCS	Radiological Control Standard
RGD	radiation-generating devices
RPP	radiation protection program
S&S	safeguards and security
S/CI	suspect/counterfeit item
SAC	specific administrative control
SAR	safety analysis report
SARA	Superfund Amendment Reauthorization Act
SARP	safety analysis report for packaging
SC	safety class
SME	subject matter expert

ACRONYMS	
SES	Senior Executive Service
SMS	safety management system
SNM	special nuclear material
SQA	software quality assurance
S/RID	standards/requirements identification document
SS	safety significant
SSCs	structures, systems, and components
SSO	safety system oversight
SSSP	site safeguards and security plan
STSM	senior technical safety manager
SWDA	Solid Waste Disposal Act
TLVs	threshold limit values
TQP	technical qualification program
TSPP	Technical Standard Program Procedure
TSR	technical safety requirement
USQ	unreviewed safety question
USQD	unreviewed safety question determination
VA	vulnerability analysis
VAR	vulnerability assessment report
WPPAS	work package proposal and authorization system
WS&H	worker safety and health
WSS	work smart standards

PURPOSE

The purpose of this reference guide is to provide a document that contains the information required for a National Nuclear Security Administration (NNSA) technical employee to successfully complete the Senior Technical Safety Manager (STSM) Functional Area Qualification Standard. In some cases, information essential to meeting the qualification requirements is provided. Some competency statements require extensive knowledge or skill development. Reproducing all the required information for those statements in this document is not practical. In those instances, references are included to guide the candidate to additional resources. Additional reference material is available in the *Federal Technical Capability Manual*, chapter 3, section 3, "Senior Technical Safety Managers," available in the Department of Energy (DOE) Directives home page at http://www.directives.doe.gov/. In some cases, the references listed herein are located in the archive section of the Directives home page.

SCOPE

This reference guide has been developed to address the competency statements in the October 2006 version of DOE-STD-1175-2006, *Senior Technical Safety Manager Functional Area Qualification Standard*. Competency statements and supporting knowledge and/or skill statements from the qualification standard are shown in contrasting bold type, while the corresponding information associated with each statement is provided below it. The qualification standard for the STSM contains 22 competency statements.

The competencies and supporting knowledge, skill, and ability statements are taken directly from the functional area qualification standard. Most corrections to spelling, punctuation, and grammar have been made without remark, and all document-related titles, which variously appear in roman or italic type or set within quotation marks, have been changed to plain text, also mostly without remark. Capitalized terms are found as such in the qualification standard and remain so in this reference guide. When they are needed for clarification, explanations are enclosed in brackets.

Every effort has been made to provide the most current information and references available as of May 2007. However, the candidate is advised to verify the applicability of the information provided. It should be noted that some of the Directives referred to have been archived.

A comprehensive list of acronyms and abbreviations is found at the beginning of this document. It is recommended that the candidate review the list prior to proceeding with the competencies, as the acronyms and abbreviations may not be further defined within the text unless special emphasis is required.

Please direct your questions or comments related to this document to the NNSA Learning and Career Development Department.

ACKNOWLEDGEMENTS

Original graphics provided by Department of Energy, National Training Center course staff.

TECHNICAL COMPETENCIES

1. An STSM shall demonstrate the ability to effectively communicate technical safety expectations and issues, both orally and in writing.

a. Discuss the means of developing and/or enhancing alliances with external groups (e.g., other agencies and Governments, Congress, and clientele groups).

The extensive and varied alliances STSMs are required to cultivate require equally extensive and varied approaches. The information below provides suggested approaches, but is not all-inclusive.

DOE P 141.2, *Public Participation and Community Relations*, provides guidance in building alliances. This DOE Policy states that public participation is open, ongoing, two-way communication, both formal and informal, between DOE and its stakeholders concerning DOE's missions and activities. Effective public participation is at the core of good community relations, which is essential for DOE facilities to achieve their missions. Regular, interactive communication enables all parties to learn about and better understand each other's views and positions.

The policy also provides a mechanism for bringing a broad range of stakeholder viewpoints and community values into DOE's decision making early in the process. This early involvement enables DOE to make more informed decisions and build mutual understanding and trust between DOE, the public it serves, and the communities that host its facilities.

The methods used to encourage public participation will vary widely in nature and scope and may include, but are not limited to, informal conversations, written and electronic communication, scheduled meetings and workshops, legally required hearings, and Federal, state, local, and tribal meetings. Under the policy, DOE actively seeks, considers, and responds in a timely manner to the views of its stakeholders, thereby providing them an opportunity to influence decisions.

The goals of the DOE public participation and community relations policy are as follows:

- DOE will actively seek to identify stakeholders, consider public input, and incorporate or otherwise respond to the views of its stakeholders in making its decisions.
- The public will be informed in a timely manner and empowered to participate at appropriate stages in DOE's decision making processes. Such processes will be open, understandable, and consistently followed. Managers will define clear access points for public input from the earliest stages of a decision process and will provide adequate time for stakeholders to participate.
- Credible, effective public participation processes, including active community outreach, will be consistently incorporated into DOE program operations, planning activities, and decision making processes at HQ and in the field. Employees within the DOE complex will share responsibility for promoting and improving public participation and community relations.
- DOE will conduct periodic reviews of its public participation and community relations efforts.

Congressional notifications are intended to ensure that the appropriate committees are promptly and fully informed of changes in program activities. Information may be conveyed in written correspondence or through informal discussion with the appropriate committees.

When events or conditions in the fiscal year necessitate changes to the approved budget, proposals must be communicated to the congressional committees responsible for those appropriations. Processes are in place to address changes for reprogramming, restructuring, appropriation transfer, notification, and deferral and rescission proposals.

When changes do not require formal or internal/limited reprogramming procedures, but may affect areas known to be of interest or concern to Congress, DOE will notify the appropriate committees of changes in program activities to ensure they are promptly and fully informed.

In these cases, DOE may elect to notify the appropriate committees through less formal procedures. The Office of the Chief Financial Officer's informal discussions with the appropriate committee, or a Secretarial Officer's correspondence with the appropriate committee, serves as sufficient notification of the impending actions.

b. Represent and speak for the organizational unit on safety management issues (e.g., presenting, explaining, selling, defending, and negotiating) to those within and outside the Department.

Note: This element is performance based. The Qualifying Official will evaluate its completion.

c. Discuss the benefits to safety management of promoting effective communication and exchange across the Department, including:
- **Focused sharing of information;**
- **Interaction and resolution of issues; and**
- **Use of lessons learned**

DOE-STD-7501-99, *The DOE Corporate Lessons Learned Program*, states that the application of lessons learned plays a key role in maintaining integrated safety management systems (ISMSs) and in improving DOE and contractor programs, processes, and practices integral to ISMSs.

At the local level, contractor managers are expected to describe lessons learned programs as part of their safety management system descriptions. These descriptions should express the local management expectations for the development, communication, and use of lessons learned. They should also describe, in whole or by reference, the infrastructure mechanisms that support development, sharing, and use of lessons learned.

The Department established Integrated Safety Management (ISM) as a Department-wide approach for managing and performing work safely. ISM defines five work-cycle functions: identifying the work, analyzing the hazards, defining the controls, performing the work, and feedback and continuous improvement. It also describes three basic levels of work within which these functions are performed: the institutional, site, and activity levels. It is expected that lessons learned will be identified, shared, and used within each function, for inter-

relationships among functions, and within and among the three organizational levels of work planning and performance.

The use of lessons learned is a principal component of an organizational culture committed to continuous improvement. The methods used to instill lessons learned as part of the culture vary, as do the mechanisms for identifying, sharing, and using lessons learned.

The nature of the work and the complexity of the organization are prime determinants of cultural and infrastructure support for lessons learned. Cultural methods often include setting expectations, providing support and incentives, conducting monitoring and providing feedback, and continuous improvement. Infrastructure mechanisms typically include the clear definition of resources, processes, and procedures by which personnel are supported to identify, share, and use lessons learned. The infrastructure mechanisms are often referred to as lessons learned programs.

Lessons learned programs include two basic processes. The first is a development process that includes identification, documentation, validation, and dissemination of a lesson learned. The second is a utilization and incorporation process that includes identification of applicable lessons learned, distribution to appropriate personnel, identification of actions that will be taken as a result of the lessons learned, and follow-up to ensure that appropriate actions were taken. In addition to these elements, lessons learned programs contain processes to measure operational performance improvement and program effectiveness.

The benefits to safety management of promoting effective communication and exchange across the department are derived in part from DOE M 450.4-1, *Integrated Safety Management System Manual*. These include Enhanced Work Planning, a process that evaluates and improves the program by which work is identified, planned, approved, controlled, and executed. An additional benefit is that an organization having a positive safety culture is characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventive measures.

d. Describe how the following expectations are effectively communicated within an organization to build a continuous improvement culture:
- **Development and exploration of new ideas are encouraged;**
- **Process quality and safety responsibilities within the organization are understood;**
- **Individuals know how their work contributes to safety objectives and strategic goals;**
- **Unsafe practices, nonconforming items, and potential areas for improvement are readily identified; and**
- **Enhanced product and process safety and reliability are emphasized.**

DOE M 450.4-1, *Integrated Safety Management System Manual*, states that organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventive measures. Among the attributes of balanced priorities, and one of the seven guiding principles of ISM, is that organization managers frequently and consistently

communicate the safety message both as an integral part of the mission and as a stand-alone theme.

Based on experience and learning since the inception of ISM, the Department identified four supplemental safety culture elements to be used, along with the existing ISM guiding principles, to help develop the appropriate context or environment for effective implementation of ISM systems within DOE and at its sites and facilities in the future. These supplemental elements contain one common thread: effective communication.

Examples of some of the characteristics attributed to these elements are listed as follows:

- Individuals promptly report errors and incidents. They feel safe from reprisal in reporting errors and incidents. They offer suggestions for improvements.
- Individuals cultivate a constructive, questioning attitude and healthy skepticism when it comes to safety. Individuals question deviations and avoid complacency or arrogance based on past successes. Team members support one another through both awareness of each other's actions and constructive feedback when necessary.
- Individuals are aware of and counteract human tendencies to simplify assumptions, expectations, and analysis. Diversity of thought and opposing views are welcomed and considered. Intellectual curiosity is encouraged.
- Candid dialogue and debate and a healthy skepticism are encouraged when safety issues are being evaluated. Differing professional opinions are welcomed and respected. Robust discussion and constructive conflict are recognized as a natural result of diversity of expertise and experience.
- Line managers regularly and promptly communicate important operational decisions, their basis, expected outcomes, potential problems, and planned contingencies.
- The insights and fresh perspectives provided by performance assurance personnel are valued. Organizational feedback is actively sought to make performance assurance activities more value-added.
- Senior line managers are periodically briefed on results of oversight group activities to gain insight into organizational performance and to direct needed corrective actions.
- Open communications and teamwork are the norm. People are comfortable raising and discussing questions or concerns. Good news and bad news are both valued and shared.
- A high level of trust is established in the organization. Reporting of individual errors is encouraged and valued. A variety of methods are available for personnel to raise safety issues without fear of retribution.
- Organization members convene to swiftly uncover lessons and learn from mistakes. Frequent incident reviews are conducted promptly after an incident to ensure data quality to identify improvement opportunities.
- Performance improvement processes encourage workers to offer innovative ideas to improve performance and to solve problems.

e. Prepare and present a briefing to senior management or stakeholders on the state of safety for a given facility or site.

Note: This element is performance based. The Qualifying Official will evaluate its completion.

2. An STSM shall have a working level knowledge of the policies and procedures used to recruit, select, train, and qualify employees to establish and maintain technical competency.

a. Discuss planning, recruitment, and selection processes that can be used to acquire a technically competent workforce with the necessary knowledge, skills, abilities, and/or potential to accomplish the goals of the organization.

DOE O 360.1B, *Federal Employee Training*, states that one of the functions of training is its use as a tool to recruit and maintain a talented, diverse, and versatile workforce. It establishes the training requirements to improve workforce performance related to the mission and strategic objectives of DOE through a cyclical program of training planning, needs analysis and assessment, design, development, implementation, and evaluation.

It is DOE policy that the program and functions described in DOE M 426.1-1A, *Federal Technical Capability Manual*, be used to recruit, deploy, develop, and retain a workforce that can ensure DOE accomplishes its missions in a safe and efficient manner.

Several tools, collectively referred to as administrative flexibilities, are available to provide options in Federal employment actions supporting recruitment, hiring, and retention of high-quality employees. Line managers and servicing personnel offices should reference this manual for information about recruitment, hiring, and retention.

The manual also details the following four specific programs as important tools for HQ and field organizations to recruit and retain high-quality technical staff:

- Career Intern Program
- Excepted service appointments
- Bonuses and incentives
- Potential career progression for qualified technical personnel

DOE Order 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*, establishes selection, qualification, and training requirements for M&O contractor personnel involved in the operation, maintenance, and technical support of DOE and NNSA category A and B reactors and nonreactor nuclear facilities. It contains the minimum requirements that must be included in training and qualification programs to ensure consistent and effective training for personnel at DOE nuclear facilities. Attachment 1, "Contractor Requirements Document," specifies contractor selection, training, and qualification requirements of DOE nuclear facility contractor personnel. Discuss the parameters of the Excepted Service Authority(ies), the circumstance which would dictate use of an Excepted Service Authority, and the process and procedures for using an Excepted Service Authority to recruit and hire.

DOE M 426.1-1A states that the excepted service appointment authority found in section 621(d) of the DOE Organization Act is available for hiring up to 200 high-quality individuals who may otherwise be difficult to attract and retain under current competitive service rules and procedures. Although primarily intended for scientific, engineering, and technical positions, this authority may also be used for professional and administrative positions and for positions in operations not related to defense nuclear facility safety.

DOE O 320.1, *Acquiring and Positioning Human Resources*, describes the process for promoting and placing candidates in the competitive service. It provides guidance, instructions, and responsibilities for position classification under the General Schedule (GS), Excepted Service (EJ and EK), and Federal Wage System and for processing position classification appeals within DOE. Additional information can be found in

- 5 USC 51, "Classification"
- 5 CFR 511, "Classification under the General Schedule"
- OPM publication TS-107, *The Classifier's Handbook* (August 1991), which provides information and guidance regarding position classification standards
- OPM, *The Federal Wage System Operating Manual*, available online at http://www.opm.gov/oca/wage/APPFUND.HTM
- OPM publication TS-44, *Federal Grading System for Trades and Labor Occupations* (September 1981), which governs classification under the Federal Wage System

Further guidance on the appropriate use of excepted service authorities is available from your servicing personnel office or the Executive and Technical Resources Division at HQ. Actions to fill positions under these authorities are subject to reviews and approval by the Department's Executive Resources Board

b. Discuss ways to motivate, reward, recognize, and retain excellent employees or recognize a major contribution to the organization using local rewards programs or the programs described in the Departmental Administrative Flexibilities Guide.

There are a variety of monetary and non-monetary awards that can be used as tools to motivate, reward, or recognize technically excellent employees. These should be used in a progressive manner commensurate with the nature of the contribution or continuous contributions to increase employee responsiveness and mission accomplishment. Some of the major monetary awards are

- Special Act or Service Award
- On-the-Spot Monetary Recognition Award
- Performance Management System Award
- Quality Step Increase

Non-monetary awards include

- Time Off Award
- Exceptional Service Award
- Non-monetary Superior Accomplishment Awards

c. Discuss the role and responsibilities of the FTCP and Panel Agents in the recruitment, selection, training, and retention of technical personnel.

The Federal Technical Capability Panel is a group of senior line managers assigned by the Deputy Secretary to oversee the Federal Technical Capability Program and provide recommendations regarding the technical competence of DOE employees. The Panel is responsible for the following functions:

- Approving technical qualification program components or elements that have DOE-wide implications
- Concurring with the designation of STSM positions

- Reviewing technical qualification program plans to ensure each office's plan is consistent with the objectives and requirements of the Federal Technical Capability Program
- Periodically reviewing and assessing the effectiveness of the TQP

As found in DOE M 426.1-1A, the objective of the Program and its agents is to recruit, deploy, develop, and retain Federal employees with the necessary technical capabilities to safely accomplish the Department's missions and responsibilities.

d. Describe methods used to assess an employee's unique developmental needs and why providing developmental opportunities to employees could contribute to the achievement of organizational goals.

The immediate supervisor must annually discuss training needs with each employee in regard to job requirements, including technical qualification standards and the competencies needed to meet those requirements. Immediate supervisors must have this discussion with new and reassigned employees within 60 days of the person's joining DOE or being reassigned.

Each employee must have the opportunity to prepare an individual development plan that must be reviewed and revised, as appropriate, annually. Supervisors must ensure that all employees have an individual development plan, except where supervisors determine and record that individual development planning would result in little or no benefit to DOE because of an employee's position, expertise, career status, performance level, or personal circumstances.

The individual development plan describes reasonable and appropriate employee training objectives and activities.

Specific methods include needs analysis, task analysis, and resource analysis.

References: DOE M 360.1-1B

e. Describe in general the training and qualification requirements for contractors specified in DOE Order 5480.20A, Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities.

The operating contractor should establish one or more organizations to be responsible for the training of operating organization personnel. These organizations should be held accountable for providing facility line management with the support necessary to ensure that personnel in the operating organization are qualified to safely and effectively meet job requirements. The responsibilities, qualifications, and authority of training organization personnel should be documented, and managerial responsibilities and authority clearly defined.

Qualification is defined in terms of education, experience, training, examination, and any special requirements necessary for performance of assigned responsibilities. The requirements are based on industry standards and are intended to provide reasonable assurance that personnel at DOE nuclear facilities possess qualifications to operate and maintain the facility safely and reliably under all conditions.

Operating organizations should define qualification requirements for personnel in each functional level. The relative importance of managerial and technical competence should be considered by management in establishing these requirements. Specific knowledge and skills differ for each level in the organization. At the higher functional level, managerial competence is the dominant need, whereas technical competence is the dominant need at other functional levels.

Although applied broadly to personnel in the operating organization, the term "qualification" has a different application for different positions. For example, managers and technical staff personnel may be considered qualified by virtue of meeting the entry-level requirements associated with the position and by completing applicable position-specific training. A comprehensive examination need not be administered to determine their qualification. Continuing training and professional development programs should be established to meet the needs of the individual and the position. Satisfactory performance of assigned duties and assessment of individual performance such as that which is typically included in personal performance appraisals may be used to document continued satisfactory performance.

Technician and maintenance personnel qualification should include demonstrated performance capabilities (performance demonstrations) to ascertain their ability to adequately perform assigned tasks. Written examinations should also be administered to personnel in these positions. However, a comprehensive final examination need not be administered to ascertain formal qualification of technicians and maintenance personnel (with the exception of radiological control technicians, who should comply with the requirements of the DOE *Radiological Control Manual*). Participation in continuing training programs is required to maintain and improve their abilities to continue to function safely in the operating organization. Their continued satisfactory performance of assigned duties and their satisfactory participation in the continuing training program serve as sufficient evidence of maintenance of their qualification.

Qualification of operators and their immediate supervisors should include examinations, as applicable to the position. Written examinations and performance demonstrations should be administered to qualified operators and supervisors. Written and oral examinations and operational evaluations should be administered to certified operators and supervisors. Initial qualification/certification for a position should include a comprehensive examination to ascertain the person's suitability to perform assigned duties. Participation in the continuing training program should be required, following initial qualification, to the extent to which it applies to the position. Upon a participant's completion of the continuing training program, requalification may be achieved by either successfully completing a comprehensive requalification examination, including any operational evaluations or performance demonstrations that may be specified, or by successfully completing periodic examinations (e.g., quarterly) during the requalification cycle. In either case, after a participant completes the continuing training program, the Qualifying Official should indicate by signature that the person has successfully completed the requalification program and is formally requalified.

Qualification may be granted only after it has been assured that all requirements have been satisfactorily completed. Qualification of operators and their immediate supervisors in the operating organization is valid for a period not to exceed two years unless it is revoked for cause.

f. Discuss the responsibilities of DOE elements in meeting the requirements for the Technical Qualification Program as described in DOE M 360.1-1B.

Each DOE element must have training policies and/or procedures that establish an integrated cycle of organizational needs analysis and training needs assessment, planning, resource allocation, design and delivery, evaluation, and reporting processes that are consistent with the requirements and responsibilities of DOE M 360.1-1B.

Each DOE element required to establish a TQP must develop and implement a TQP plan as a separate component of its training plan. Technical qualification program plans must be approved by the head of the element and must include the process and requirements for

- identifying personnel and positions required to participate in the TQP;
- identifying and maintaining technical qualification standards or individual qualification requirements, as appropriate;
- evaluating employees against qualification standards and documenting the approval of equivalencies for DOE-wide competencies;
- establishing and updating individual development plans, training plans, qualification cards, or related records to document learning activities;
- implementing continuing training and requalification programs;
- applying evaluation requirements for completing the technical qualification standard (e.g., written or oral examinations).

Qualification requirements must be documented by each DOE element in qualification standards or by other appropriate means. These requirements must be established using the systematic approach to training methodology, and must include the necessary basic technical knowledge, technical discipline competency requirements, and position-specific knowledge, skills, and abilities.

Headquarters and field elements must conduct periodic self-assessments of the implementation of the TQP. These assessments must be conducted and documented in accordance with the FTCP's *Technical Qualification Program Assessment Guidance and Criteria.* The results of technical qualification program assessments must be submitted to the FTCP for review.

Each element must maintain and make accessible to employees and officials with oversight responsibilities, for each incident of training, the following information: training participant name and identification number; approving and authorizing official(s), objective(s), source, location, cost, duty and non-duty training hours; beginning and end dates; and training evaluation/completion documentation. In addition, tax liability and continued service obligations record must be maintained, if applicable.

Each element must maintain documentation of element-supported training activities for a minimum of 5 years or as otherwise required by records schedules, regulation, or law.

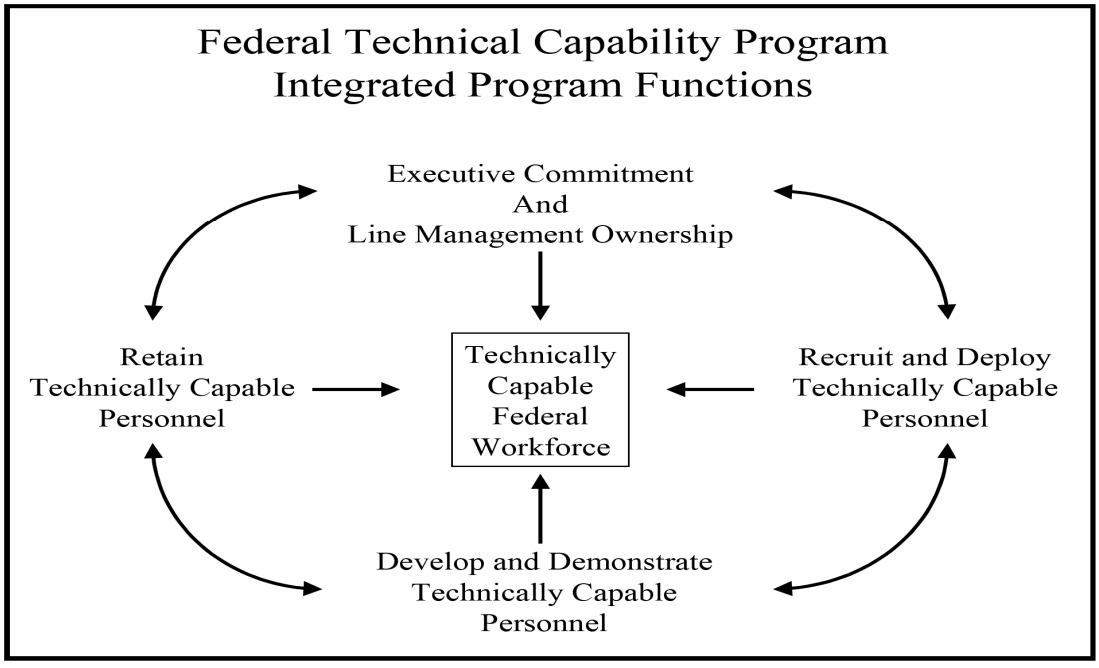
g. Describe the Federal Technical Capability Program as defined in DOE M 426.1-1A, Federal Technical Capability Program Manual, and discuss that application of the program in your organization.

The Secretary of Energy issued DOE P 426.1, *Federal Technical Capability Policy for Defense Nuclear Facilities*, to institutionalize the Federal Technical Capability Program. This program specifically applies to those offices and organizations performing functions related to the safe operation of defense nuclear facilities. It applies to all aspects of recruitment, deployment, development, and retention of Federal employees in these organizations.

The objective of the FTC Program is to recruit, deploy, develop, and retain Federal employees with the necessary technical capabilities to safely accomplish the Department's missions and responsibilities. The Department identified guiding principles to accomplish that objective, and detailed four general functions of the FTC Program in the Department's Integrated Safety Management Guiding Principles:

- Federal personnel possess the experience, knowledge, skills, and abilities that are necessary to discharge their safety responsibilities.
- Line managers are accountable and have the responsibility, authority, and flexibility to achieve and maintain technical excellence.
- Supporting organizations (personnel, training, contracts, finance, etc.) recognize line managers as customers and effectively support them in achieving and maintaining technical capabilities.
- An integrated corporate approach is required to ensure that necessary technical capabilities and resources are available to meet the overall needs of the Department's defense nuclear facility missions.

The conceptual model incorporating the FTC Program functions stemming from these guiding principles is illustrated in the following figure. It shows the interrelationship and interdependence among the functions. For the FTC Program to succeed, all functions must succeed.



Source: DOE M 426.1-1A

Federal Technical Capability Program

The Federal Technical Capability Panel (the Panel) was formed recognizing that corporate leadership and line management ownership are essential to successfully implement a program to recruit, develop, deploy, and retain technical capability at defense nuclear facilities.

The Panel consists of senior managers designated as agents to represent HQ and field elements with defense nuclear facility responsibilities. The Panel reports to the Deputy Secretary and is responsible for overseeing issues affecting the DOE FTC Program. This includes overseeing the TQP, which includes the SSO Program, the FR Program, and the STSM Program; conducting periodic assessments of the effectiveness of the FTC Program, using internal and independent experts; and providing recommendations to senior departmental officials regarding DOE technical capability.

FTCP agent responsibilities are to

- coordinate development of the annual workforce analysis and staffing plan for their organizations;
- assist FEMs/PSOs/LPSOs in developing and implementing staffing plan performance indicators and submitting them to the Panel;
- oversee implementation of the TQP for their organizations;
- assist FEMs/PSOs/LPSOs in establishing or maintaining formal STSM programs for their organizations;
- facilitate recruitment to fill open STSM positions with technically competent individuals;
- concur with STSM vacancy announcements to ensure the inclusion of adequate selection criteria;
- concur with competitive selections for STSM positions where the individual has not previously qualified as an STSM;
- participate in, or oversee, FTC Program assessments and TQP assessments within their organizations;
- solicit information and feedback from people in their organizations regarding the improvement of the technical capability of the Department's workforce;
- keep people in their organizations informed of the progress/problems associated with execution of the FTC Program, and seek support from senior officials regarding successful implementation;
- assist with the development of the FTC Program Annual Action Plan.

Note: This element is performance based and organization specific. The Qualifying Official will evaluate its completion.

h. Describe the following three types of mentoring relationships and discuss the types of goals that an organizationally sponsored mentoring program is intended to meet:

- **Supervisor;**
- **Informal; and**
- **Structured-facilitated**

Supervisor

The supervisor serves as an effective coach/mentor; provides continuous, honest, and timely performance feedback to staff; takes timely action to establish performance expectations; celebrates, recognizes, and/or rewards performance successes and accomplishments; and deals with performance deficiencies.

Informal

An informal relationship is a structured, but informal, agreement between two individuals outside the normal employee/supervisory relationship, wherein the mentor provides assistance to the participant in his/her career development planning process. Mentoring can provide valuable coaching and feedback regarding career plans and choices.

Structured-Facilitated

DOE offers structured programs that are designed to train and develop employees in specific disciplines. Some examples are

- Acquisition Career Development Program
- Facility Representative Mentoring Program

The objective of the NNSA Future Leaders Program (FLP) is to recruit and develop technically competent professionals to eventually manage programs and projects, including managing energy-related and national defense weapons-related programs at nuclear and non-nuclear facilities or reacting to threats of nuclear terrorism. The program provides experiences that will build and strengthen technical knowledge and oversee the application of theory to real-world problems in actual work situations.

The FLP is a 2-year program that is designed to develop technical competencies as well as leadership skills. During the two years, participants receive orientation and leadership training as well as discipline-specific training. Participants are also required to serve on 2 rotational assignments during the two-years, one for 60 days and one for 30 days at other NNSA sites located around the United States. The FLP provides opportunities that build and strengthen the participants' technical and leadership knowledge base.

References: DOE O 360.1A
DOE O 360.1B
DOE-STD-1063-2006
www.nnsa.doe.gov/futureleaders/NNSA_WS_090.html

i. Discuss the benefits to the Department and individual organizational units which could be realized through use of the following:
- **Mentoring program; and**
- **Special assignment/detail**

Mentoring Program

The Mentoring Program is a 1-year program designed to foster career and leadership development, expand employees' knowledge, skills, and abilities, and broaden understanding of DOE and its programs. It also aims to develop a workforce that is capable of adapting to the rapidly changing workplace environment. The program features employees at the Senior

Executive Service (SES), as well as GS-13 to GS-15 level employees, serving as mentors to all DOE Federal employees who have strong leadership potential.

The mentoring relationship is the result of a deliberate pairing of a more skilled and/or experienced person with a lesser skilled and/or experienced person who has demonstrated potential. The benefits to the Department include the development of a diverse, high-performance workforce, continued employee professional and personal growth, and an enhancement of leadership capabilities and interpersonal skills.

Future Leaders Program

The NNSA manages the FLP to develop recent college graduates to fill critical positions that will be opening within the Agency in the next several years. The training and developmental assignments offered by this program will provide program participants with the opportunity to assume leadership positions.

Those selected will receive a 2-year excepted service appointment in the Federal Government, which will either be continued in the excepted service after 2 years for those in technical positions, or converted to a career conditional or career appointment after 2 years for those in positions other than technical positions. Participants are in a trial period during the full 2 years of the program. Specifics on the program are found in element 2.i.

Special Assignment/Detail

Special assignment or details provide employees with opportunities to diversify their skills, increase their knowledge, and enhance their abilities.

References: http://www.nnsa.doe.gov/futureleaders/NNSA_WS_090.html

j. Describe the process to obtain technical assistance and the types of assets available.

Although there are currently no directives that drive the process for obtaining technical assistance, information for nonnuclear operations is available from the Office of Worker Safety and Health Assistance. Nuclear facilities may secure assistance through the Office of Nuclear Safety and Environmental Assistance. Assets include SME's, other technical staff, and resources such as the DOE Web site. The Departmental Issues Management Process is one vehicle that may be utilized to ensure the proper assistance is directed to the request.

As of the writing of this guide, a directive is being proposed that will become the driver for this process.

k. Describe the process for enrolling or participating in the Department's technical assistance units.

As with the previous element, there are currently no directives that drive the process for enrolling or participating in the Department's technical assistance units. To participate in the technical assistance units, contact the Director of the Office of Health and Safety for nonnuclear operations and the Director of the Office of Nuclear and Facility Safety Policy for nuclear operations.

l. Describe the process for obtaining the technical assistance of an individual from another office on a temporary or detail basis.

Refer to element 2.k above for information regarding how to obtain technical assistance.

m. Describe other Departmental capabilities/resources that could be utilized to solve short-term technical safety issues.

Refer to element 2.k above for information regarding how to obtain technical assistance. Other STSM personnel may also be contacted for assistance, and depending on the nature of the issue, personnel referrals to other facilities with the expertise needed to resolve technical safety issues may be provided.

n. Conduct a workforce analysis to determine the gap in needed critical technical competencies for a given facility or site.

Note: This element is performance based. The Qualifying Official will evaluate the analysis results.

The following information provides guidance to be considered by program offices in developing workforce plans. It should be noted that with respect to integrating diversity into plans, organizations need to create a performance culture that respects diversity, and that can be reinforced through the performance system by incorporating a diversity element for supervisors and monitored by the use of survey results.

Workforce Analysis

Four information sources provide key workforce information needs. They are (1) organization direction and (2) environmental factors (demand analysis); (3) internal and (4) external labor (supply analysis). Ways to collect this information can be found in DOE M 426.1-1A, *Federal Technical Capability Manual.* Analyze the supply (current workforce profile) against the demand (future workforce profile), and identify the discrepancies between supply and demand analyses.

Forecasting is considering the future needs of the organization. One of the most useful outcomes of this effort is the identification of potential problems or issues facing the organization. This analysis will be based on the data collected from the information sources in the analysis effort. The results of this effort will help develop gap analysis and emergent strategies to manage the future. It involves the identification of any predicted changes and/or developments that may result from the demand/supply analysis. Business elements may have varying issues identified based on needs of their organizations. The aim is to create necessary resources/strategies to optimize the future position of the organization. There are four steps in the forecasting process: identifying key workforce assumptions, validating assumptions, utilizing assumptions for scenario building, and performing gap analysis. There are three questions that need to be addressed in the forecasting process. They are as follows:

1. Where does the business element want to be? (Utilizing assumptions information to suggest future demand)
2. Where is the organization now? (Based on the workforce analysis)
3. What are the gaps in meeting this demand? (Demand versus supply analysis)

The first step is to identify key workforce assumptions/issues for the elements, based on the data/information collected from the information sources during the analyzing effort. Ensure that all of these forecasting assumptions describe the potential impact on the business element, any inherent risks, and any likelihood of occurrence based on element culture.

The second step is to validate these assumptions by utilizing focus groups or administering questionnaires/interviews to various leaders in the organization. The feedback provided will ensure that gathered assumptions are valid and based on the best data available. Additionally, feedback should provide insight into the reasoning behind the assumptions.

The third step is utilizing these assumptions in scenario building. Scenarios are a way to develop alternative futures based on different combinations of assumptions, facts, and trends that will help in meeting the forecasting goals mentioned earlier. Scenarios are generally a descriptive statement, presenting a particular picture of the future, that includes comments on the probability of certain events occurring. Moreover, scenarios are usually accompanied by qualitative or quantitative information. Scenario building may clarify options. The following scenarios should be outlined based on the assumptions:

- Best case scenario - any warning indicators (metrics) in the narrative description
- Worst case scenario - any warning indicators (metrics) in the narrative description
- Most likely scenario - any warning indicators (metrics) in the narrative description

The next step after outlining best, worst and most likely scenarios is to create a preferred scenario detailing what the organization wants as an outcome taking into account the assumptions previously identified. Additionally, include the information from any warning indicators above which should be used to monitor changes consistent with your preferred outcome.

It is useful to apply a strength, weakness, opportunities, and threats (SWOT) analysis. Strengths and weaknesses are internal factors. Opportunities and threats are external factors. It is a simple technique that uses four perspectives for decision making and summarization. Identify the strengths, weaknesses, opportunities, and potential threats for each scenario suggesting the best, worst, and most likely outcomes. A PESTLE (political, economic, sociological, technological, legal, and environmental) analysis is essentially the same technique but is useful for examining the external factors affecting a problem.

The above tools (SWOT and PESTLE) are useful for handling qualitative data. Either tool will help to organize and promote thinking about issues or problems that are facing your business elements. It will help to clarify/identify future trends and to apply those trends to the organization to help explicitly identify any underlying assumptions and to set priorities. For example, in using the SWOT analysis, step one is to identify the assumption(s) and utilize a matrix using the demands and supply information obtained in the analysis effort. Step 2 is to identify assumptions/key workforce issues from step 1 and take into account the potential impact on business elements, potential impact of assumption, risk inherent in the assumption, and the likelihood of its occurrence.

The final step in forecasting is performing gap analysis. After completing the preferred scenario, look back at the current workforce and future demands to identify any gaps in skills, people needed to meet preferred scenarios, etc. Demand is based on the preferred

scenario and competencies/skills needed to meet demand requirements. The gap analysis should indicate the skills gap, surplus, any recruitment issues, and retention issues to meet the demand, etc. This would continue until suggested strategies, initiatives, and/or actions to deal with the preferred outcomes to meet the organization's needs are developed. To help in the gap analysis, these questions must be addressed:

- What will be the potential sources of new staff that will be required?
- What attrition and retirement can be expected over the next 5 years?
- Will attrition make it easier or harder to achieve workforce objectives?
- What kind of positions will need to be filled?
- How can training /re-training help?
- Succession planning implications?
- Competitive sourcing solutions?
- Impact of budget decisions on any mission critical occupations?
- Any redeployment concerns or issues with current staff?
- Are new hires going to be required, and if so are they going to replace current employees or go into newly established positions?

Additional information and models of SWOT and PESTLE are available in the Guide to Workforce Planning at the Department of Energy Web page at http://humancapital.doe.gov/hcm/WFP.htm#Phase1

o. Participate as member of an oral examination board for qualification in a TQP functional area.

Note: Although this element is performance based and the Qualifying Official will evaluate its completion, the following information is provided to assist a candidate participating in a TQP functional area oral examination board.

DOE-HDBK-1080-97, *Guide to Good Practices for Oral Examinations*, defines "oral board" as an oral examination covering a broad area of knowledge (at the job level vs. task or duty area) involving the questioning of one trainee/job candidate by one or more examiners. Its purpose is to determine if a trainee has achieved the level of knowledge required for qualification as a facility operator, supervisor, etc. An oral board may be used as the final check of qualification, or it may be combined with an operational evaluation/plant walkthrough. Oral boards usually cover all facets of facility or process operation. This includes

- facility components
- system interrelationships
- normal/abnormal situations involving systems and interrelated systems and components

Oral examinations should probe the trainee's understanding of fundamental principles and his or her ability to apply these principles to practical situations, equipment and system operation, and normal and abnormal operating procedures. Examinations should be based on knowledge of information within the scope of the learning objectives. Special emphasis should be placed on the trainee's ability to apply this knowledge to facility operations.

To prepare for the board, each board member should prepare questions (with answers) to be asked during the board. Questions should represent a cross section of the material contained in the learning objectives. Follow-up questions (with answers) should also be prepared prior to the board.

Board members should bring copies of their prepared questions and answers to share with the other board members. This practice helps prevent grading differences between board members.

Each board member should independently grade each question that the board member is qualified to grade. The grades should be recorded on a standard form by each board member, and the board chair should assign the overall board grade. These forms, completed and signed by each board member, should become a part of the trainee's training record.

p. Review and evaluate the succession plan for a given facility or site.

Note: Although this element is performance based and the Qualifying Official will evaluate its completion, the following information is provided to assist a candidate in reviewing and evaluating the succession plan for a given facility or site.

The Office of Personnel Management document, "*5 Step Workforce Planning Model*," shows that a lack of career development opportunities is one of the primary reasons an employee leaves an organization. Employee retention is impacted by how well the organization identifies and communicates to employees (and potential employees) its career paths, entry points, and appropriate competencies for the career paths. A good succession plan should include actions that

- establish career paths;
- determine what competencies are required for the various career paths;
- assess an employee's competencies;
- determine whether or not an adequate number of employees with the ability to develop the required competencies for succession purposes exist within the organization;
- provide employees with the results of the assessment, including the areas of strengths and the areas of weakness for each career path;
- identify development opportunities for employees to strengthen selected competencies.

The Department's succession planning model has been developed for DOE elements to utilize for their specific succession planning needs. The figure below, from the *DOE Human Capital Management Strategic Plan*, April 2004, illustrates the Department's guidance for succession planning.

This succession planning model derives strategic direction input from the strategic management cascade, which includes the DOE strategic plan, program plans, 5-year plans, annual performance plans, performance standards, and finally, performance and accountability reports.

Source: DOE Human Capital Management Strategic Plan, April 2004

Succession planning model

The *NNSA Human Capital Management Strategic Guide*, September 2005, provides a set of clear and reliable performance measures for the effectiveness of the NNSA succession plan:

- The number of NNSA employees selected to NNSA leadership positions in the GS-13 and higher level
- The number of employees availing themselves of formal leadership training opportunities, including participation in the DOE mentoring program
- The number of self-assessments completed through the Department's tool
- The number of individual development plans showing requests for leadership training, activities, or programs
- The ratio of participants in leadership programs to those actually being selected for leadership positions
- An annual review of the competencies required for NNSA leadership positions

q. Lead or participate in a self-assessment of the implementation of an organization's implementation of the technical qualification program in accordance with DOE M 426.1-1A.

Note: Although this element is performance based and the Qualifying Official will evaluate its completion, the following information is provided to assist a candidate through leading or participating in a self-assessment of the implementation of a given organization's implementation of the TQP.

The *Technical Qualification Program Accreditation and Process Criteria*, dated December 27, 2005, provides the accreditation objectives and criteria for TQP implementation self-assessment.

Briefly, they are as follows:

- TQP-1, Demonstration of Competence. The program clearly identifies and documents the process used to demonstrate employee technical competence.
- TQP-2, Competency Levels. Competency requirements are clearly defined and consistent with applicable industry standards for similar occupations.
- TQP-3, Plans and Procedures. Plans and/or procedures are developed and implemented to govern administration of the program.
- TQP-4, Qualification Tailored to Work Activities. The program identifies unique Department- and position-specific work activities, and specifies the knowledge and skills necessary to accomplish that work.
- TQP-5, Credit for Existing Technical Qualification Programs. The program is structured to allow credit, where appropriate, for other TQP accomplishments.
- TQP-6, Transportability. Competency requirements identified as applying throughout the Department are transferable.
- TQP-7, Measurable. The program contains sufficient rigor to demonstrate compliance with the principles.

3. An STSM shall have a working level knowledge of the INPO Principles for a Strong Nuclear Safety Culture and their application to DOE.

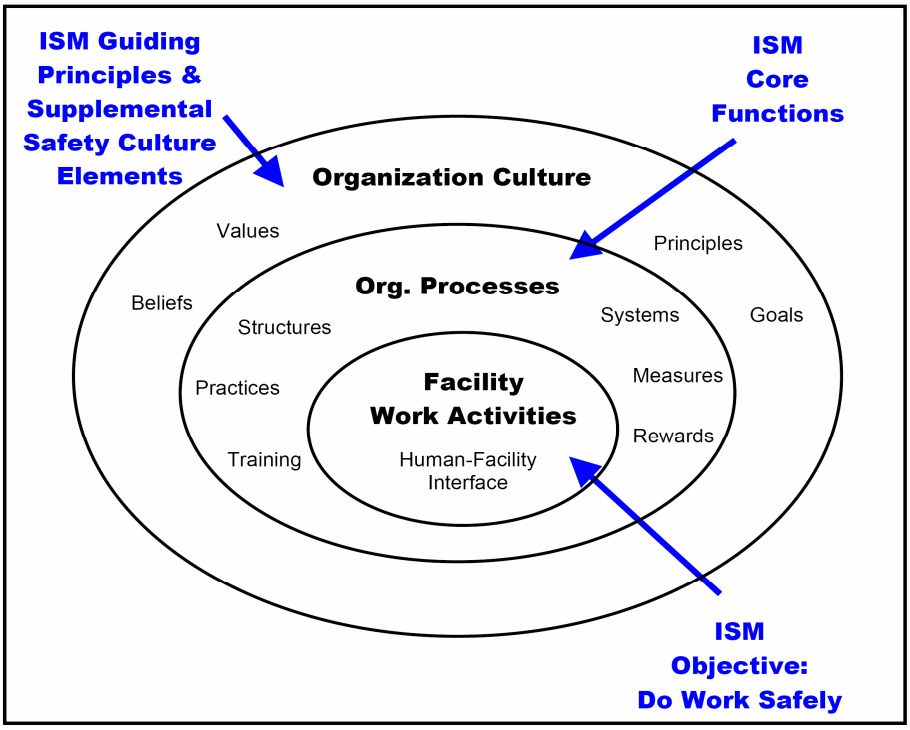
a. Compare, contrast, and describe organizational culture, safety culture, and safety conscious work environment as they relate to nuclear missions in DOE.

The Institute of Nuclear Power Operations (INPO) document *Principles for a Strong Nuclear Safety Culture* provides the following definitions:

> Organizational culture: the shared basic assumptions that are developed in an organization as it learns and copes with problems. The basic assumptions that have worked well enough to be considered valid are taught to new members of the organization as the correct way to perceive, think, and feel. Culture is the sum total of a group's learning. Culture is for the group what character and personality are for the individual.
>
> Safety culture: an organization's values and behaviors — modeled by its leaders and internalized by its members — that serve to make nuclear safety the overriding priority.
>
> Safety-conscious work environment: a work environment with freedom to raise concerns without fear of retribution.

DOE M 450.4-1, *Integrated Safety Management System Manual*, defines the safety culture of an organization as the product of individual and group values, attitudes, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety programs. Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventive measures.

The following figure depicts various levels within an organizational culture. The outer level represents the environment within which the work must take place. The outer level is most influenced by the ISM principles (and the supplemental safety culture elements). The next level is the process level, where management systems are defined to direct behaviors. This level is most influenced by the ISM functions. The innermost level is the activity-level work itself, where operational work is performed. This work is the direct interaction between people and physical facility, and is mostly performed by DOE contractors. This is the level at which organizations can measure ultimate performance results and determine whether the ISM program objectives have been realized. Performance measures at other levels can show how effectively the process and culture support the desired safety objectives. Showing work at the inner-most level does not mean that work is not required at the other levels; indeed, work activities are required at the other levels to develop work processes and work environments that are highly reliable and error tolerant.



Source: DOE M 450.4-1

Levels within an organizational culture

Organizations are systems, and it is important that the organization be measured at all three levels, with their alignment routinely assessed. Understanding the performance and perceptions at each level is essential to the development of integrated organizational, process, and work activity improvements that are likely to be effective and sustaining.

The Department wants to integrate the ISM core functions, ISM principles, high reliability organization principles, human performance improvement principles and methods, lessons learned, and internal and external best safety practices into a proactive safety culture where (1) facility operations are recognized for their excellence and high reliability, (2) everyone

accepts responsibility for their own safety and the safety of others, (3) organization systems and processes provide mechanisms to identify systematic weaknesses and assure adequate controls, and (4) continuous learning and improvement is expected and consistently achieved. The revitalized ISM system is expected to define and drive desired safety behaviors, to help DOE and its contractors create a world-class safety culture, and ultimately to result in achievement of performance excellence.

Eleven key characteristics of organizational culture are identified and defined below:

1. Individual initiative: the degree of responsibility, freedom, and independence that individuals have in the organization.
2. Risk tolerance: the degree to which employees are encouraged to be aggressive, innovative, and risk seeking.
3. Direction: the degree to which the organization creates clear objectives and performance expectations.
4. Integration: the degree to which units within the organization are encouraged to operate in a coordinated manner.
5. Management support: the degree to which managers provide clear communication, support, and assistance to their subordinates.
6. Control: the number of rules and regulations and amount of direct supervision that are used to oversee and control employee behavior.
7. Identity: the degree to which members identify with the organization as a whole rather than with their particular work group or field or professional expertise.
8. Reward system: the degree to which reward allocations (e.g., salary increases, promotions) are based on employee performance criteria in contrast to seniority, favoritism, and so on.
9. Conflict tolerance: the degree to which employees are encouraged to air conflicts and criticisms openly.
10. Communication patterns: the degree to which organizational communications are restricted to the formal hierarchy of authority.
11. Ethical climate: the degree to which the organization has clear guidelines about ethical behavior and promotes social responsibility.

b. Identify and discuss the safety culture lessons learned from the Columbia Space Shuttle Accident and their applicability to DOE.

In July 2005, DOE issued a combined action plan for lessons learned from the Columbia Space Shuttle Accident and the Davis-Besse reactor vessel head corrosion incident. Details are in element 3.c of this reference guide.

c. Identify and discuss the safety culture lessons learned from the Davis-Besse Reactor Vessel Head Degradation Incident and their applicability to DOE.

Ten lessons learned identified from these events have applicability to DOE:

1. Operating Experience. People and organizations need to learn valuable lessons from internal and external operating experience to avoid repeating mistakes and to improve operations.
2. Mission and External Influences. To prevent unsound program decisions, budget and schedule pressures must not override safety considerations.

3. Normalizing Deviations. Routine deviations from an established standard can desensitize awareness of prescribed operating requirements and allow a low-probability event to occur.
4. Technical Inquisitiveness. To ensure safety, managers need to encourage employees to freely communicate safety concerns and differing professional opinions.
5. Focus on Planning and Prevention. Safety efforts should focus more on planning and preventive actions rather than on investigations and corrective actions resulting from accidents or events.
6. Organizational Structure. An effective organizational structure with clear roles and responsibilities and appropriate checks and balances is essential.
7. Self-Assessment and Oversight. Successful operations require critical self-assessment and oversight to find problems.
8. Organization Staffing and Qualification. Robust technical capability, enhanced through ongoing technical and leadership training, is essential for complex operations.
9. Corrective Action Programs. Corrective actions that address the underlying causes of problems must be managed to resolution and verified to be effective.
10. Complacency. Management must guard against complacency brought on by good performance metrics and past successes.

These lessons learned are discussed in more detail below.

1. Operating Experience

DOE uses many standard program requirements across the complex, such as the radiological control and quality assurance programs prescribed in DOE directives, that lead to common causes, practices, and lessons learned. However, DOE must also deal with a myriad of operations that involve differing technologies and unique organizations applicable to that project or technology. Accordingly, a problem may manifest itself in one site or plant, e.g., mixed oxide (MOX) fuel production, but it is not readily apparent how the problem and its solution apply to other DOE activities, e.g., cleanout of K-Basin or operation of a Defense Waste Processing Facility (DWPF). Accordingly, DOE needs to implement a stronger operating experience program that is able to examine underlying technical, organizational, or safety culture issues to enhance feedback and continuous improvement for all DOE operations.

DOE must pay attention to its own "weak signals" (e.g., near misses, equipment failures, minor conduct of operations problems) that can be precursors to more significant events if the underlying causes are not identified and corrected. Benchmarking should be encouraged as a way to evaluate the lessons of good work practices from other organizations so that these practices can be applied to improve operations.

2. Mission and External Influences

The Department, like other Government agencies, has extensive program activities in support of national requirements and desires. It is also bound to a congressional budget process that attempts to balance funds across broad priorities. Efforts to improve the productivity of operations must be carefully weighed against changes to the infrastructure and processes that have prevented a high-consequence event in the complex for decades. This is not to say that enhancements are not possible, but that safety must be the top priority. DOE has long

recognized the potential for cost and schedule pressures to have an undesirable impact on the safe conduct of work. Line organizations have the responsibility for ensuring there are adequate resources to conduct work safely.

The language in two of the DEAR contract clauses —48 CFR 970.5223-1, "Integration of Environment, Safety and Health (ES&H) into Work Planning and Execution," and 48 CFR 970.5215-3, "Conditional Payment of Fee, Profit, and Other Incentives" — was drafted to ensure that all contractors are applying the appropriate resources to accomplish work safely with adequate ES&H funding. However, all DOE contracting officers may not have effectively used the budget-related provisions of the annual update process, or the conditional payment of fee, profit and other incentives clause, in levying award fee penalties.

Many line programs have established processes to manage ES&H funding requirements in their budgets and work plans. Some of these processes are formalized, like the Office of Environmental Management's Integrated Planning and Budgeting System (IPABS). However, not all programs are equally effective in managing ES&H resource requirements.

Even where there is effective DOE management of resources necessary to conduct work safely, organizational pressures to meet performance deadlines (e.g., qualify for award fee) can result in workers using shortcuts or performing unsafe acts to complete work faster. Management must be aware that their actions speak louder than words; if they are stressing the schedule rather than safety and reliability, the work force will deliver on-time no matter the cost in terms of safety.

3. Normalizing Deviations

Appendix 3 to the NNSA *Columbia Accident Investigation Board (CAIB) Lessons Learned Report (2004), Minority Opinion,* states in part, "We have at least one major contractor who does not have an approved Quality Assurance Plan to comply with a nuclear safety rule (10 CFR 830) promulgated in 1994." Other discrete examples exist of facilities within the DOE complex where requirements are not fully implemented or routinely followed. Effort is needed to identify these noncompliances and resolve them. The Working Group is not certain to what extent "normalization of deviations" is an issue for other DOE operations. However, an action to establish a safety exemption baseline is included in this plan.

4. Technical Inquisitiveness

In organizations as large as the DOE complex, voices can be missed. Efforts must be taken to encourage personnel to speak out and ensure that paths are readily available to communicate safety issues. Managers must take any safety concerns seriously and, if necessary, take action to address them prior to allowing operations to continue. In addition, DOE has no formal differing professional opinion process; one is required.

When NNSA reviewed the CAIB report, it found situations in DOE where some line managers presume operations are safe unless proven otherwise. As such, the onus is frequently placed on safety professionals to prove that operations are unsafe, rather than requiring line managers to demonstrate that they are safe. Early identification of evolving problems is necessary not only to resolve the issue as soon as possible, but also to re-establish a stable and safe nuclear configuration.

5. Focus on Planning and Prevention

The Department is an organization that performs complex, high-hazard operations. The prevention of high-consequence events in this type of organization, known as a high-reliability organization (HRO), has been an area of much research over the past 15 years. INPO has been a key participant in this effort and has developed several relevant publications. For the past year, the Office of Environment, Safety and Health has offered voluntary training on INPO's Excellence in Human Performance. This Human Performance Initiative (HPI) is intended to promote behaviors throughout an organization that support safe and reliable operation. Progress toward excellent human performance requires a work environment in which individuals and leaders routinely exhibit desired behaviors. Such behaviors must be clearly described, communicated, and — most importantly — reinforced. Peer pressure, open communication, and positive reinforcement can establish a culture in which individuals, leaders, and organizational processes eliminate obstacles to excellent human performance. This culture will reduce or even eliminate events due to human error.

6. Organizational Structure

The DOE has the responsibility to ensure that operations at its facilities are conducted safely. The DOE *Safety Management Functions, Responsibilities, and Authorities Policy*, DOE P 411.1, defines the DOE safety management functions, responsibilities, and authorities to ensure that work is performed safely and efficiently, and it succinctly defines DOE's expectation regarding its employees' responsibilities for safety management.

7. Self-Assessment and Oversight

Like NASA, DOE contracts for its operations. Like the NRC, DOE establishes the standards and regulates these operations. DOE's oversight guidance must establish clear guidelines and an unambiguous framework (i.e., frequency, technical focus and bases, reporting, synthesizing findings, and communications) for oversight of ES&H topics. The DOE nuclear safety rule, 10 CFR 830, "Nuclear Safety Management," identifies management processes required for nuclear safety. These processes include configuration control, maintenance (including system surveillances), lessons-learned programs, and use of lessons learned in training and qualification. These programs are not uniformly implemented and should be monitored in an operations environment.

8. Organization Staffing and Qualification

DOE has undergone a number of organizational changes, most notably the creation of NNSA and their stand-up of the NNSA Service Center. A significant percentage of DOE personnel are eligible for retirement in the next few years. Ensuring the proper number and qualification of DOE staff is essential to fulfill the complete spectrum of Department responsibilities. DOE operates complex and hazardous facilities. DOE personnel responsible for monitoring contractor performance and observing work in progress are required to have, at a minimum, a level of technical competency that reflects a working knowledge of engineering and scientific fundamentals. Managers, supervisors, and field personnel must be technically competent, be technically aware of plant conditions, and possess sufficient practical experience and skills to demonstrate requisite technical inquisitiveness to oversee operations and pursue anomalous conditions.

9. Corrective Action Programs

Organizations at every level within the DOE complex have one or more systems for tracking corrective actions, yet internal and independent assessments routinely report recurring deficiencies that have been ineffectively addressed. The ISM function of feedback and improvement is not uniformly and effectively implemented throughout the Department.

10. Complacency

Since the Rocky Flats fire in 1969, the Department has not experienced a catastrophic accident near the magnitude of the Columbia incident. This decades-long success record might lead one to a level of comfort with DOE operations. The Department must actively work to enhance safety to prevent a degradation of acceptable safety performance and an unacceptable high-consequence event.

The language in the contract clause, 48 CFR 970.5223-1," Integration of Environment, Safety and Health into Work Planning and Execution," establishes the contractual requirement for ISM and the governing requirements for contractor programs. In addition, the DEAR clause, 48 CFR 970.5215-3, "Conditional Payment of Fee, Profit, and Other Incentives — Facility Management Contracts," provides DOE contracting officers with a tool to avoid complacency. The clause requires the DOE contracting officer to reduce a contractor's fee payment should the contractor not meet their agreed-upon annual environment, safety, and health program requirements, established as a result of the annual update process of 48 CFR 970.5223-1 (e), or if the contractor experiences significant adverse events.

d. Given a scenario, analyze, identify, and describe potential signs of a strong or weak safety culture within an organization.

Note: Although this element is performance based and the Qualifying Official will evaluate its completion, the following information is provided to assist a candidate in evaluating safety culture in an organization.

Strong culture is said to exist where staff respond to stimulus because of their alignment to organizational values.

In a recent paper by Annick Carnino, Director, Division of Nuclear Facility for the International Atomic Energy Agency, an organization's safety culture is broken down into the following stages:

- Stage I. The organization in stage I sees safety as an external requirement and not as an aspect of conduct that will help the organization to succeed. The external requirements are those of national Governments, regional authorities, or regulatory bodies. There is little awareness of behavioral and attitudinal aspects of safety performance, and no willingness to consider such issues. Safety is seen very much as a technical issue. Mere compliance with rules and regulations is considered adequate.
- Stage II. An organization in stage II has a management that perceives safety performance as important even in the absence of regulatory pressure. Although there is growing awareness of behavioral issues, this aspect is largely missing from safety management methods that comprise technical and procedural solutions. Safety performance is dealt with, along with other aspects of the business, in terms of targets

or goals. The organization begins to look at the reasons why safety performance reaches a plateau, and is willing to seek the advice of other organizations.

- Stage III. An organization in stage III has adopted the idea of continuous improvement and has applied the concept to safety performance. There is a strong emphasis on communications, training, management style, and improving efficiency and effectiveness. Everyone in the organization can contribute. Within the organization, some behaviors are seen as enabling improvements, and others are seen as barriers to further improvement. Consequently, people also understand the impact of behavioral issues on safety. The level of awareness of behavioral and attitudinal issues is high, and measures are being taken to improve behavior. Progress is made one step at a time and never stops. The organization asks how it might help other companies.

This information should assist the candidate in the analysis and identification of potential signs of strong or weak safety culture within an organization. The full text of the paper is available at the Web site referenced below.

References: http://www-ns.iaea.org/publications/mng-safety.htm

e. Explain how INPO Safety Culture Principles are applied for a given organization and its associated mission in DOE.

Note: This element is performance based and site specific. The Qualifying Official will review and verify the explanation's adequacy. The following information is provided as guidance.

The INPO document *Principles for a Strong Nuclear Safety Culture* describes the following safety culture principles:

- Nuclear safety is everyone's responsibility.
- Leaders demonstrate commitment to safety.
- Trust permeates the organization.
- Decision making reflects safety first.
- Nuclear technology is recognized as different.
- A questioning approach is cultivated.
- Organizational learning is embraced.
- Nuclear safety undergoes constant examination.

Nuclear Safety is Everyone's Responsibility

Responsibility and authority for nuclear safety are well defined and clearly understood. Reporting relationships, positional authority, staffing, and financial resources are commensurate with and support nuclear safety responsibilities. Corporate policies emphasize the overriding importance of nuclear safety.

The attributes of this principle are as follows:

- The line of authority and responsibility for nuclear safety is defined from the board of directors to the individual contributor. Each of these positions has clearly defined roles, responsibilities, and authorities, designated in writing and understood by the staff.

- People and their professional capabilities, values, and experiences are regarded as the nuclear organization's most valuable assets. Staffing levels are consistent with the demands related to maintaining safety and reliability.
- Board members and corporate officers periodically take steps to reinforce nuclear safety, including conducting site visits to assess management effectiveness first-hand.
- The line organization is the primary source of information and the only source of direction. Other parties, such as oversight organizations and committees, review boards, or outside advisors that provide management information essential to effective self-evaluation, are not allowed to dilute or undermine line authority and accountability.
- Relationships among utilities, operating companies, and owners are not allowed to obscure or diminish the line of responsibility for nuclear safety.
- The system of rewards and sanctions is aligned with strong nuclear safety policies and reinforces the desired behaviors and outcomes.
- All personnel understand the importance of adherence to nuclear safety standards. Healthy accountability is exercised at all levels of the organization for shortfalls in meeting standards.

Leaders Demonstrate Commitment to Safety

Executive and senior managers are the leading advocates of nuclear safety and demonstrate their commitment both in word and action. The nuclear safety message is communicated frequently and consistently, occasionally as a stand-alone theme. Leaders throughout the plant organization set an example for safety through their direct involvement in training and field oversight of important plant activities.

The attributes of this principle are as follows:

- Managers and supervisors practice visible leadership in the field by placing "eyes on the problem," coaching, mentoring, and reinforcing standards. Deviations from station expectations are corrected promptly.
- Continuous oversight is provided during safety-significant tests or evolutions.
- Managers and supervisors are personally involved in high-quality training that consistently reinforces expected worker behaviors.
- Leaders recognize that challenging production goals can appear to send mixed signals on the importance of nuclear safety. Managers are sensitive to detect and avoid these misunderstandings.
- The bases, expected outcomes, potential problems, planned contingencies, and abort criteria for important operational decisions are communicated promptly to workers.
- Informal opinion leaders in the organization are encouraged to model safe behavior and influence peers to meet high standards.

Trust Permeates the Organization

A high level of trust is established in the organization. There is a free flow of information in which issues are raised and addressed. Employees are informed of steps taken in response to their concerns.

The attributes of this principle are as follows:

- A variety of methods are available by which personnel can raise nuclear safety concerns without fear of retribution.
- Employees are expected and encouraged to offer innovative ideas to help solve problems.
- Differing opinions are welcomed and respected. When needed, fair and objective methods are used to resolve conflict and unsettled differing professional opinions.
- Supervisors are skilled in responding to employee questions in an open, honest manner. They are recognized as an important part of the management team, crucial to translating safety culture into practical terms.
- Impacts of impending organizational changes (such as those caused by sale or acquisition, bargaining unit contract renegotiations, and economic restructuring) are anticipated and managed such that trust in the organization is maintained.
- Complete, accurate, and forthright information is provided to oversight, audit, and regulatory organizations.

Decision Making Reflects Safety First

Plant personnel are systematic and rigorous in making decisions that support safe, reliable plant operation. Operators are vested with the authority and understand the expectation, when faced with unexpected or uncertain conditions, to place the plant in a safe condition. Senior leaders support and reinforce conservative decisions.

The attributes of this principle are as follows:

- The organization maintains a knowledgeable workforce to support a broad spectrum of operational and technical decisions. Outside expertise is employed when necessary.
- Plant personnel apply a rigorous approach to problem solving. Conservative actions are taken when understanding is incomplete.
- Single-point accountability is maintained for important safety decisions, allowing for ongoing assessment and feedback as circumstances unfold.
- Managers regularly communicate to the workforce important decisions and their bases as a way of demonstrating and reinforcing a healthy safety culture.
- Candid dialogue and debate are encouraged when safety issues are being evaluated. Robust discussion and healthy conflict are recognized as a natural result of diversity of expertise and experience.
- Decision making practices reflect the ability to distinguish between “allowable” choices and prudent choices.

Nuclear Technology is Recognized as Different

The special characteristics of nuclear technology are taken into account in all decisions and actions. Reactivity control, continuity of core cooling, and safety margin management are valued as essential, distinguishing attributes of the nuclear station work environment.

The attributes of this principle are as follows:

- Activities that could affect core reactivity are conducted with particular care and caution.

- Features designed to maintain critical safety functions, such as core cooling, are recognized as particularly important.
- Design and operating margins are carefully guarded and changed only with great thought and care. Special attention is placed on maintaining defense-in-depth.
- Equipment is meticulously maintained well within design requirements.
- Insights from probabilistic risk analyses are considered in daily plant activities and plant change processes.
- Plant activities are governed by comprehensive, high-quality processes and procedures.
- Employee mastery of reactor and power plant fundamentals, as appropriate to the job position, establishes a solid foundation to support sound decisions and behaviors.

A Questioning Approach is Cultivated

Individuals demonstrate a questioning attitude by challenging assumptions, investigating anomalies, and considering potential adverse consequences of planned actions. All employees are watchful for conditions or activities that can have an undesirable effect on plant safety.

The attributes of this principle are as follows:

- While individuals expect successful outcomes of daily activities, they recognize the possibility for mistakes and worst-case scenarios. Contingencies are developed to deal with these possibilities.
- Anomalies are thoroughly investigated, promptly mitigated, and periodically analyzed in the aggregate. Personnel do not proceed in the face of uncertainty.
- Workers do not live with conditions or behaviors that have the potential to reduce operating or design margins. These circumstances are promptly identified and corrected.
- Group-think is avoided through diversity of thought and intellectual curiosity. Opposing views are encouraged and considered.

Organizational Learning is Embraced

Operating experience is highly valued, and the capacity to learn from experience is well developed. Training, benchmarking, and self-assessments are used to stimulate learning and improve performance.

The attributes of this principle are as follows:

- The organization avoids complacency and cultivates a continuous learning environment. The attitude that "it can't happen here" is not allowed in the organization.
- Training effectively upholds management's standards and expectations. Beyond teaching knowledge and skills, trainers are adept at instilling nuclear safety values and beliefs.
- Individuals are well informed of the underlying lessons learned from significant industry and station events, and they are committed to not repeating these mistakes.
- Expertise in root cause analysis is applied effectively to examine events and improve safety focus.
- Processes are established to identify and resolve latent organizational weaknesses that can aggravate relatively minor events if not corrected.

Nuclear Safety Undergoes Constant Examination

Oversight is used constructively to strengthen safety and improve performance. Nuclear safety is kept under constant scrutiny through a variety of monitoring techniques, some of which provide an independent "fresh look."

The attributes of this principle are as follows:

- A mix of self-assessment and independent oversight reflects an integrated and balanced approach. This balance is periodically reviewed and adjusted as needed.
- Periodic safety culture assessments are conducted and used as a basis for improvement.
- The pitfalls of over-focusing on a narrow set of performance indicators are recognized. The organization is alert to detect and respond to indicators that may signal declining performance.
- The insights and fresh perspectives provided by quality assurance, assessment, and independent oversight personnel are valued.
- Senior executives and board members are periodically briefed on results of oversight group activities to gain insights into station safety performance.

4. An STSM shall have a working level knowledge of the mechanisms used to develop, approve, implement, and improve contractor Integrated Safety Management (ISM) Systems.

a. Describe the overall objective of the Department-wide DOE M 411.1-1C, Safety Management Functions, Responsibilities, and Authorities Manual, and the similar lower-tier organization-level manuals developed by Headquarters Offices and Field elements.

DOE M 411.1-1C, *Safety Management Functions, Responsibilities, and Authorities Manual*, is the corporate-level document that defines safety management functions, responsibilities, and authorities for DOE senior management with responsibilities for line, support, oversight, and enforcement functions. In accordance with DOE P 411.1, line, support, oversight, and enforcement organizations within DOE must develop and issue documents that define how their assigned functions and responsibilities are properly discharged. These documents are referred to as functions, responsibilities, and authorities documents. Each organizational FRA must define the safety management functions for the organization and clearly identify who within the organization has the responsibility and authority to perform those functions. Delegations of authority to subordinate managers and staff must be clearly listed and complete. The FRA must be updated to reflect any changes to delegations of the authority, and must generally describe the process for control and revision of the document. Field office organizations with missions that affect the safety of work performed at DOE facilities are also required to develop and implement FRAs.

b. Give an example of a circumstance that might make it necessary or reasonable to deviate from the responsibilities and authorities identified in the Functions, Responsibilities, and Authorities Manual and describe the exemption process in DOE M 251.1-1A, Departmental Directives Program Manual.

[Note: DOE M 251.1-1A was cancelled and superseded by DOE M 251.1-1B.]

One example would be whenever a DOE official determines that a specific requirement in a directive is not appropriate for an individual office or a facility under the responsibility of that office.

Exemption Process

Exemptions from DOE directives are approved by heads of departments. For environment, safety, and health requirements for category 1 hazard nuclear facilities, exemptions are approved by the cognizant Secretarial Officer (CSO). The process begins with a representative of a DOE field element submitting a written request for exemption. Requests for exemptions must address the following information:

- Site or facility for which an exemption is being requested
- Reference to the requirements from which exemption is sought
- Identification and justification of the acceptance of any additional risks that will be incurred if the exemption is granted
- Benefits to be realized by providing the exemption
- Indication of whether the exemption being requested is temporary or permanent, and for temporary exemptions, indication of when compliance will be achieved
- Identification of other pertinent data or information used as a basis for obtaining an exemption

Requests for exemptions to ES&H requirements should also address the following:

- A description of any special circumstances that warrant the granting of an exemption, including whether (1) application of the requirement in the particular circumstances would conflict with another requirement; (2) application of the requirement in the particular circumstances would not achieve, or is not necessary to achieve, the underlying purpose of the requirement; (3) application of the requirement in the particular circumstances would not be justified by any safety and health benefit; (4) the exemption would result in a health and safety benefit that compensates for any detriment that would result from granting the exemption; or (5) there exists any other material circumstances not considered when the requirement was adopted for which it is in the public interest to grant an exemption.
- Steps to be taken to provide adequate protection of health, safety, and the environment, and a statement that adequate protection will be provided.
- A description of any alternative or mitigating actions that have been or will be taken to ensure adequate safety, health, and protection of the public, the workers, and the environment for the period the exemption will be effective.

Contractors follow the same basic methodology, but submit their written request to the contracting officer or the contracting officer's representative.

Approval Criteria

For all exemption decisions, the approving official may grant an exemption only if the exemption

- is not prohibited by law;
- would not present an undue risk to public health and safety, the environment, or facility workers; and
- is warranted under the circumstances.

Approval Process

The approval authority must provide copies of the exemption request, appropriate supporting documentation, and the draft exemption, and with respect to each exemption request, views from each of the following parties before granting an exemption:

- The CSO
- The OPI
- EH for ES&H requirements
- The NNSA CTA for requirements listed on the NNSA Index of Baseline Nuclear Safety Requirements

The approval authority may not grant the exemption until

- The parties have indicated that there is no objection, or
- thirty (30) calendar days have passed without objection after providing the parties the draft exemption and associated documentation. (If a party requests additional information, they will be granted an additional 14 calendar days after requested additional information has been provided.)

c. Discuss in detail the requirements contained in Department of Energy Acquisition Regulations (DEAR) Clauses 970.5223-1, Integration of Environment, Safety and Health into Work Planning and Execution, DEAR 970.5204-2, Laws, Regulations and DOE Directives, and DEAR 970.5215-3, Conditional Payment of Fee.

48 CFR 970.5223-1

Following is 48 CFR 970.5223-1 in its entirety.

> Integration of Environment, Safety, and Health Into Work Planning and Execution (DEC 2000).
>
> (a) For the purposes of this clause,
> (1) safety encompasses environment, safety, and health, including pollution prevention and waste minimization; and
> (2) employees include subcontractor employees.
>
> (b) In performing work under this contract, the contractor should perform work safely, in a manner that ensures adequate protection for employees, the public, and the environment, and should be accountable for the safe performance of work. The contractor should exercise a degree of care commensurate with the work and the associated hazards. The contractor should ensure that management of environment, safety and health (ES&H) functions and activities becomes an integral but visible part of the contractor's work planning and execution processes. The contractor should, in the performance of work, ensure that:
> (1) Line management is responsible for the protection of employees, the public, and the environment. Line management includes those contractor and subcontractor employees managing or supervising employees performing work.
> (2) Clear and unambiguous lines of authority and responsibility for ensuring ES&H are established and maintained at all organizational levels.

(3) Personnel possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities.
(4) Resources are effectively allocated to address ES&H, programmatic, and operational considerations. Protecting employees, the public, and the environment is a priority whenever activities are planned and performed.
(5) Before work is performed, the associated hazards are evaluated and an agreed-upon set of ES&H standards and requirements are established which, if properly implemented, provide adequate assurance that employees, the public, and the environment are protected from adverse consequences.
(6) Administrative and engineering controls to prevent and mitigate hazards are tailored to the work being performed and associated hazards. Emphasis should be on designing the work and/or controls to reduce or eliminate the hazards and to prevent accidents and unplanned releases and exposures.
(7) The conditions and requirements to be satisfied for operations to be initiated and conducted are established and agreed-upon by DOE and the contractor. These agreed-upon conditions and requirements are requirements of the contract and binding upon the contractor. The extent of documentation and level of authority for agreement should be tailored to the complexity and hazards associated with the work and should be established in a Safety Management System.

(c) The contractor should manage and perform work in accordance with a documented Safety Management System (System) that fulfills all conditions in paragraph (b) of this clause at a minimum. Documentation of the System shall describe how the contractor will:
(1) Define the scope of work;
(2) Identify and analyze hazards associated with the work;
(3) Develop and implement hazard controls;
(4) Perform work within controls; and
(5) Provide feedback on adequacy of controls and continue to improve safety management.

(d) The System shall describe how the contractor will establish, document, and implement safety performance objectives, performance measures, and commitments in response to DOE program and budget execution guidance while maintaining the integrity of the System. The System should also describe how the contractor will measure system effectiveness.

(e) The contractor shall submit to the contracting officer documentation of its System for review and approval. Dates for submittal, discussions, and revisions to the System will be established by the contracting officer. Guidance on the preparation, content, review, and approval of the System will be provided by the contracting officer. On an annual basis, the contractor should review and update, for DOE approval, its safety performance objectives, performance measures, and commitments consistent with and in response to DOE's program and budget execution guidance and direction. Resources shall be identified and allocated to meet the safety objectives and

performance commitments as well as maintain the integrity of the entire System. Accordingly, the System shall be integrated with the contractor's business processes for work planning, budgeting, authorization, execution, and change control.

(f) The contractor shall comply with, and assist the Department of Energy in complying with, ES&H requirements of all applicable laws and regulations, and applicable directives identified in the clause of this contract entitled "Laws, Regulations, and DOE Directives." The contractor should cooperate with Federal and non-Federal agencies having jurisdiction over ES&H matters under this contract.

(g) The contractor should promptly evaluate and resolve any noncompliance with applicable ES&H requirements and the System. If the contractor fails to provide resolution or if, at any time, the contractor's acts or failure to act causes substantial harm or an imminent danger to the environment or health and safety of employees or the public, the contracting officer may issue an order stopping work in whole or in part. Any stop work order issued by a contracting officer under this clause (or issued by the contractor to a subcontractor in accordance with paragraph (i) of this clause) shall be without prejudice to any other legal or contractual rights of the Government. In the event that the contracting officer issues a stop work order, an order authorizing the resumption of the work may be issued at the discretion of the contracting officer. The contractor shall not be entitled to an extension of time or additional fee or damages by reason of, or in connection with, any work stoppage ordered in accordance with this clause.

(h) Regardless of the performer of the work, the contractor is responsible for compliance with the ES&H requirements applicable to this contract. The contractor is responsible for flowing down the ES&H requirements applicable to this contract to subcontracts at any tier to the extent necessary to ensure the contractor's compliance with the requirements.

(i) The contractor shall include a clause substantially the same as this clause in subcontracts involving complex or hazardous work on site at a DOE-owned or -leased facility. Such subcontracts shall provide for the right to stop work under the conditions described in paragraph (g) of this clause. Depending on the complexity and hazards associated with the work, the contractor may choose not to require the subcontractor to submit a Safety Management System for the contractor's review and approval.

48 CFR 970.5204-2

Following is 48 CFR 970.5204-2 in its entirety.

Laws, regulations, and DOE directives (DEC 2000)

(a) In performing work under the contract, the contractor shall comply with the requirements of applicable Federal, State, and local laws and

regulations (including DOE regulations), unless relief has been granted in writing by the appropriate regulatory agency. A List of Applicable Laws and regulations (List A) may be appended to this contract for information purposes. Omission of any applicable law or regulation from List A does not affect the obligation of the contractor to comply with such law or regulation pursuant to this paragraph.

(b) In performing work under this contract, the contractor should comply with the requirements of those Department of Energy directives, or parts thereof, identified in the List of Applicable Directives (List B) appended to this contract. Except as otherwise provided for in paragraph (d) of this clause, the contracting officer may, from time to time and at any time, revise List B by unilateral modification to the contract to add, modify, or delete specific requirements. Prior to revising List B, the contracting officer shall notify the contractor in writing of the Department's intent to revise List B and provide the contractor with the opportunity to assess the effect of the contractor's compliance with the revised list on contract cost and funding, technical performance, and schedule; and identify any potential inconsistencies between the revised list and the other terms and conditions of the contract. Within 30 days after receipt of the contracting officer's notice, the contractor shall advise the contracting officer in writing of the potential impact of the contractor's compliance with the revised list. Based on the information provided by the contractor and any other information available, the contracting officer shall decide whether to revise List B and so advise the contractor not later than 30 days prior to the effective date of the revision of List B. The contractor and the contracting officer shall identify and, if appropriate, agree to any changes to other contract terms and conditions, including cost and schedule, associated with the revision of List B pursuant to the clause of the contract entitled, "Changes."

(c) Environment, Safety, and Health (ES&H) requirements appropriate for work conducted under this contract may be determined by a DOE approved process to evaluate the work and the associated hazards and identify an appropriately tailored set of standards, practices, and controls, such as a tailoring process included in a DOE approved System implemented under the clause entitled "Integration of Environment, Safety, and Health into Work Planning and Execution." When such a process is used, the set of tailored ES&H requirements, as approved by DOE pursuant to the process, should be incorporated into List B as contract requirements with full force and effect. These requirements shall supersede, in whole or in part, the contractual environmental, safety, and health requirements previously made applicable to the contract by List B. If the tailored set of requirements identifies an alternative requirement varying from an ES&H requirement of an applicable law or regulation, the contractor shall request an exemption or other appropriate regulatory relief specified in the regulation.

(d) Except as otherwise directed by the contracting officer, the contractor shall procure all necessary permits or licenses required for the performance of work under this contract.

(e) Regardless of the performer of the work, the contractor is responsible for compliance with the requirements of this clause. The contractor is responsible for flowing down the requirements of this clause to subcontracts at any tier to the extent necessary to ensure the contractor's compliance with the requirements.

48 CFR 970.5215-3

The following is an excerpt of 48 CFR 970.5215-3, which identifies contract requirements and the types of requirements associated with that contract.

(a) *General.* (1) The payment of earned fee, fixed fee, profit, or share of cost savings under the contract is dependent upon:
(i) The contractor's or contractor employees' compliance with the terms and conditions of the contract relating to environment, safety, and health (ES&H) that includes worker safety and health (WS&H), including performance under an approved ISMS; and
(ii) The contractor's or contractor employees' compliance with the terms and conditions of this contract relating to the safeguarding of restricted data and other classified information.
(2) The ES&H performance requirements of this contract are set forth in its ES&H terms and conditions, including the DOE approved contractor ISMS or similar document. Financial incentives for timely mission accomplishment or cost effectiveness shall never compromise or impede full and effective implementation of the ISMS and full ES&H compliance.
(3) The performance requirements of this contract relating to the safeguarding of Restricted Data and other classified information are set forth in the clauses of this contract entitled, "Security," and "Laws, Regulations, and DOE Directives," as well as in other terms and conditions.
(4) If the contractor does not meet the performance requirements of the contract relating to ES&H or to the safeguarding of Restricted Data and other classified information during any performance evaluation period established under the contract pursuant to the clause of the contract entitled, "Total Available Fee: Base Fee Amount and Performance Fee Amount," otherwise earned fee, fixed fee, profit or share of cost savings may be unilaterally reduced by the contracting officer.

The potential for significant negative monetary consequences, at the discretion of the contracting officer, is used as an incentive to ensure and promote mission performance.

d. Discuss in detail the process used to review and approve contractor ISM System Descriptions.

Authority for final approval of the annual ISM system description updates for field offices may be delegated to the field office managers by the Secretarial Officer after the Secretarial Officer approves the initial ISM system description. In most cases, it is recommended that the Secretarial Officer delegate this authority. Field offices should provide a clear identification and description of any changes made in annual ISM system description updates at the time the field office transmits such updates to their Secretarial Officer. In the course of its annual review, the Secretarial Officer should review changes to field office ISM system descriptions and provide any feedback that may be necessary.

As found in 48 CFR 970.5223-1, chapter 3, section 3:

> (e) The contractor shall submit to the contracting officer documentation of its System for review and approval. Dates for submittal, discussions, and revisions to the System will be established by the contracting officer. Guidance on the preparation, content, review, and approval of the System will be provided by the contracting officer. On an annual basis, the contractor shall review and update, for DOE approval, its safety performance objectives, performance measures, and commitments consistent with and in response to DOE's program and budget execution guidance and direction. Resources shall be identified and allocated to meet the safety objectives and performance commitments as well as maintain the integrity of the entire System. Accordingly, the System shall be integrated with the contractor's business processes for work planning, budgeting, authorization, execution, and change control.

References: DOE G 450.4-1B

e. Discuss the implementing mechanisms, including work planning and control, contained in the contractor's approved ISM System Description.

Implementing mechanisms include three DEAR clauses, including 48 CFR 970.5223-1, 48 CFR 970.5204-2, and 48 CFR 970,1100-1. In addition, DOE G 450.4-1B, part 5.2 of volume 1 reads as follows, and describes contractor implementation of their site ISMS description.

> DOE P 450.5 describes a transition process for DOE field element oversight as effective contractor self-assessment programs are established. The DOE field, in this case, focuses more on maintaining operational awareness of contractor work activities and reviews performance against formally established ES&H performance indicators, using contractor self assessments. The contractor organization and documentation should be structured to support these DOE functions.
>
> In its requirements for describing the ISMS, the DEAR references performance objectives and performance measures. The DEAR also tasks contractors to describe how they will measure the effectiveness of the ISMS and ensure a process of continuous improvement. Performance objectives and

performance measures have generally been linked to the contract, budget, and DOE program execution guidance. Most contractors have found it necessary, in addition to establishing performance objectives and performance measures, to establish key performance indicators to enable them to assess the effectiveness of their ISMSs. These indicators should result in a set of metrics which, if properly identified and used, would demonstrate the status of the safety management programs and the overall effectiveness of the ISMS. Circumstances at each site will cause some of the metrics to be unique although others will be the same as at other sites.

Contractors should develop a set of site- and mission-specific performance measures and performance indicators to demonstrate the accomplishment of performance and safety goals and to establish the effectiveness of the ISMS. These performance measures and indicators should be approved by DOE. In addition, the ISMS should include a mechanism for monitoring performance measures and indicators, validating the information by assessments, and providing opportunities for improvement in the ISMS. Those opportunities should then be reviewed and acted upon by the appropriate line manager. The activities listed below have proven to be useful in the development of ISMS performance measures and indicators:

- DOE and the contractor, in conjunction with the budget cycle, should define and document the mechanisms for developing and maintaining ISMS performance objectives and criteria. From these objectives and criteria, an appropriate set of assessments, performance measures, and performance indicators can be derived. The resulting data can be used to adjust the ISMS mechanisms. If serious deficiencies with the performance indicators are uncovered, a new performance objective and related performance measures and indicators should be established for the next budget cycle.
- DOE and the contractor should identify key areas that warrant measurement in thecontract as performance measures or performance indicators. They should consider as potential performance measures those mechanisms the contractor will use to implement the ISMS (e.g., worker involvement in hazard reviews, successful near-miss programs, effective employee concern programs, etc.). These should be agreed upon as tools to promote effective implementation of the ISMS. These identified measures are to be reviewed annually and modified to reflect improved performance. For more detailed information on developing performance measures, see *How to Measure Performance, A Handbook of Techniques and Tools, U.S. DOE, Trade,* which may be downloaded at http://www.llnl.gov/PBM/handbook.
- DOE and contractors should obtain and review site-specific performance information demonstrating conformance to the mechanisms in place to "integrate ES&H in work planning and execution," achieve performance objectives, and ensure overall safety performance. Target values should be developed and agreed to by both parties. The contractor would "roll up" the performance information from the facilities to support the site data. Subsequently, DOE would roll that data up to the "top-level" performance criteria established by DOE Headquarters Program Secretarial Officers' line organizations (e.g., ER, EM, Defense Programs).
- DOE Headquarters Program Secretarial Officers' line organizations should develop performance criteria that can be linked to their field organizations. All facilities

should be able to roll up their site-specific and mission-specific performance criteria into the "top-level" criteria.

- DOE and the contractor should obtain and review site-specific performance information that would assist in monitoring ISMS performance. Some examples that have proven useful include the following:
  - Causal factors for occurrences/incident reports/near-miss programs:
    - knowledge deficiency,
    - procedure deficiency,
    - safety controls not in place, and
    - safety controls not identified.
  - Causal factors for specific area violations (e.g., criticality safety, radiological controls, OSHA, etc.).
  - Benefits from ISMS:
    - work ready to start when authorized,
    - work planning time, and
    - worker's view of safety controls.
  - Oversight and contractor assessment report findings and discrepancies.
  - Corrective action reports findings and discrepancies.
  - EH site evaluation reports findings and discrepancies.
  - PAAA investigations.

Based upon the site-specific performance criteria, DOE and contractors should document associated lessons learned and improve the process for measuring ISMS performance.

f. Discuss in detail the DOE mechanisms used to oversee implementation of the contractor's ISM System Description.

The purpose of DOE P 450.5 "is to set forth the Department's expectations for Department of Energy (DOE) line management environment, safety and health (ES&H) oversight. . . DOE line oversight and contractor self-assessment together ensure that field elements and contractors are adequately implementing the DOE Safety Management System . . . This policy statement applies to DOE Headquarters and field element line organizations and to contractors." As found in DOE G 450.4-1B, volume 1:

> DOE has a significant role to play through the oversight and assessment process to ensure that the ISMS within the contractor's organization remains effective and robust. As specified in DOE P 450.5, an important element of achieving the measurable and sustained results is the oversight and assessment of the contractor's ISMS by DOE.
>
> DOE P 450.5 describes the steps to achieve the situation in which a robust, rigorous, and credible contractor ES&H self-assessment program linked to the DOE Safety Management System is in place. Prior to achieving the required self-assessment program, DOE direct oversight of the contractor's operations is more frequent and more intense. As an effective contractor self-assessment program is established, DOE field element oversight function changes to operational awareness through evaluation of ES&H performance measures and indicators, required readiness reviews, ISMS documentation reviews,

authorization basis documentation and implementation reviews, and periodic, value added appraisals of sufficient duration to confirm that the contractor performs work in a manner that protects the workers the public and the environment. Focused, planned, and structured actions are required of DOE in order to meet the expectations of DOE P 450.5. These structured oversight and assessment efforts help ensure that the ISMS achieves measurable and sustained results.

Moreover, the DOE Office of Independent Oversight, conducts independent evaluations of contractors and DOE line implementation of ISMS and reports their findings to DOE cognizant line managers, program Secretarial Officers, and to the Secretary of Energy. The DOE EH-2 reporting system for these findings has been formalized and utilizes a DOE-wide, Web-based computerized reporting and tracking system for managing DOE EH-2 oversight findings of ISMS. Line management is responsible for developing approved corrective action plans in response to DOE EH-2 findings.

DEAR 48 CFR 970.5215-3 is the conditional fee clause that includes minimum requirements for ES&H including specific expectations associated with the ISMS description approval and implementation. In order to comply with the specified contract clause, DOE will conduct oversight and focused evaluation of the contractor's ISMS. The process discussed in this chapter [chapter IV] supports that required oversight and evaluation as well as be supported by the results of the DOE oversight and evaluation for purposes of determining the ISMS effect on the fee.

The FRAM defines the following oversight and assessment requirements for DOE:

> FRAM 9.4.2.1 and 9.4.2.2 require the FEM to "direct the contractor to prepare documentation for controls for the prevention and mitigation of hazards. Review the adequacy of the controls and their documentation." It also specifies that the FEM "provide line management oversight and ensure the implementation of hazards mitigation programs and controls."
>
> FRAM 9.4.3.1 requires the FEM to "direct preparation of the authorization basis and associated safety documentation . . . and oversee implementation by the contractor."
>
> FRAM 9.4.4 requires the FEM to "monitor the proper implementation of controls, including contractor processes for unreviewed safety questions and configuration management and compliance with the technical safety requirements."
>
> FRAM 9.5.2 requires the FEM to "perform line management oversight of contractors' worker, public, environment, and facility protection programs" [and] "maintain day-to-day operational oversight of contractor activities at applicable facilities through DOE facility representatives."

FRAM 9.5.3 requires the FEM to "ensure that contractors implement quality assurance programs."

FRAM 9.6.3.1 requires the FEM to "perform management assessment of contractors (and GOGO operations) to evaluate their success in doing work safely" [and] "appraise performance of the contractor (and GOGO operations) against formally established ES&H performance measures and other ES&H performance indicators, and take appropriate action."

The above requirements will require DOE to perform related activities and reviews which will result in a oversight and assessment of the contractor's ISM program and provide important assessments that the contracting officer will need as he/she evaluates the contractor's annual ISMS update per the DEAR requirements.

Based on the above actions and responsibilities the DOE contracting officer must approve (or reject) the contractor's annual ISMS update submittal.

Annual Effectiveness Reviews of ISM Implementation. As part of the ISM core function of Feedback and Improvement, DOE field offices will perform annual self-assessment reviews of ISM implementation at the field office level. DOE field program offices will also perform line-oversight reviews of their contractor implementation of ISM, including an integrated review of contractor annual ISM reviews and declarations, if the office has more than one contractor.

Annual ISM Declarations. As part of the ISM core function of Feedback and Improvement, DOE field offices will annually declare in writing whether ISM is effectively implemented within that field office. If not, corrective or compensatory actions will be defined, tracked, and verified. Areas for improving ISM implementation performance will be clearly identified to promote continuous improvement. Annual ISM declarations should provide a detailed basis that includes the annual ISM review, lower-level ISM reviews, and pertinent feedback data from a variety of mechanisms. Annual ISM declarations should be provided to the responsible HQ program office for review.

Annual Performance Expectations and Performance Objectives. As part of the ISM core function of Feedback and Improvement, DOE field offices will annually prepare safety performance objectives, performance measures, and commitments for approval by the HQ program office.

g. Discuss the process used to maintain and update the contractor's approved ISM System Description.

Chapter 4 of DOE G 450.4-1B, Integrated Safety Management System Guide for use with Safety Management System Policies (DOE P 450.4, DOE P 450.5, DOE P 450.6); the Functions, Responsibilities, and Authorities Manual; and the Department of Energy Acquisition Regulation, volume 1 assists DOE and its contractors in (1) keeping an approved ISMS effective through continuous improvement actions and (2) describing the actions needed to develop and respond to DOE's annual program and budget execution guidance.

Keeping an ISMS current is not another Phase I and Phase II verification. It is maintaining an effective ISM and making the appropriate adjustments as lessons are learned and budgets and missions change.

The contractor and DOE are responsible for ensuring that approved ISMS descriptions are controlled by an effective feedback and improvement process so that the ISMS description remains current and reflects any changes to the mission, program objectives, and budget direction from DOE. Information on ISMS performance, such as performance measures, self-assessment findings, independent assessment findings, and other relevant feedback, should be factors in DOE and contractor ISMS feedback, improvement, and change control processes. One area for continual improvement is the integration of environmental, safety, and health system elements that already exist, but that may not be fully integrated within the ISMS. These may include pollution prevention and waste minimization, environmental regulatory compliance, chemical safety, implementation of Greening the Government Executive orders, etc.

DOE and the contractor are responsible for a number of efforts to maintain and improve the effectiveness of the ISMS and to perform an annual review. Existing appraisal and assessment activities provide some of the necessary feedback to maintain and improve the ISMS.

Contractor Annual and Continuous Activities

These activities should include the following:

- Reviewing the status of post-facility ISM verification activities that include completion of the implementation process, resolution of opportunities for improvement identified by the verification process, and expanding noteworthy practices as appropriate (see section 4.1.1 of DOE G 450.4-1B for details).
- Selecting appropriate performance measures and indicators.
- Improving the adequacy and effectiveness of the ISMS on a continuing basis in response to DOE oversight and contractor self-assessment, including progress in meeting performance measures, objectives, and commitments (see section 4.1.2 of DOE G 450.4-1B for details).
- Submitting ISMS revisions as scheduled by the contracting officer. It is recommended that any system revision be coordinated with the annual update to performance measure changes that result from budget guidance.
- Establishing an effective ISM system feedback and improvement process.

DOE Annual and Continuous Activities (see section 4.2 of DOE G 450.4-1B for details)

These activities should include the following:

- Establish dates for discussions and revisions to the system. Coordination with the response to budget guidance is recommended.
- Develop and promulgate program and budget execution guidance as well as direction to the contractor concerning ES&H performance objectives, performance measures, and commitments.
- Assess/self-assess DOE's performance in compliance with organizational and departmental ISM requirements.

- DOE line oversight of the contractor's ISMS and the review and approval of the contractor's annual ISMS revisions as well as the ES&H performance objectives, performance measures, and commitments.

Additional Considerations

Additional considerations include the following:

- Conditions and considerations that could lead to some portion of or a complete re-verification of either the contractor ISMS description (phase I) or of the implementation of a satisfactory description (phase II) might include
  - a change of contractor resulting in a significant revision to the ISMS description;
  - a situation in which the assessment results of a DOE EH-2 Safety Management Evaluation identify safety problems, a series of safety problems occur, problems are found in readiness reviews, or other indicators call the adequacy of the system or related processes into question (see section 4.3 of DOE G 450.4-1B for details);
  - a major change of mission at a particular site or facility (see section 4.1.3 of DOE G 450.4-1B for details);
  - changes to applicable Federal, state, and local laws and regulations as well as changes to DOE directives (see section 4.1.4 of DOE G 450.4-1B for details).

DOE and contractors in doing this annual ISMS review should use the performance measures, performance indicators, and their ISMS assessment and feedback and improvement processes in the framework of the review aids in section 4.4 of DOE G 450.4-1B. Contractors should address the relevant issues in their scheduled ISMS submittal that responds to budget guidance and contracting officer scheduled updates. The aids in section 4.4 of DOE G 450.4-1B should help DOE to structure the annual submittal.

The review is not another verification. Rather, it is the integration of numerous system-related activities in a manner that assists management in assuring that work is performed safely (i.e., in a manner that protects the public, workers, and environment form harm). The oversight process developed in response to DOE P 450.5 is crucial to this effort.

At the completion of the ISMS implementation verification (Phase II), some implementation issues may remain. These are documented in the verification report. It is recommended that the contracting officer schedule discussions on the status of correction of these identified issues. They should be addressed in the ISMS revision submittal if so directed. Likewise, the status of issues and actions identified in previous discussions and DOE EH-2 Safety Management Evaluations may be addressed.

Sections (d) and (e) of 48 CFR 970.5223-1 require the contractor to develop ES&H performance objectives, performance measures, and commitments, and to update them on an annual basis. Those paragraphs also require the contractor to measure ISM system effectiveness and on an annual basis to identify and allocate resources to meet both the objectives and performance commitments, and maintain the integrity of the system. As identified in ISMS function five, this effort should ". . . continue to improve safety management." If the results of this activity require changes to the system description, they should address those changes in the scheduled submittal on budget guidance response to

DOE for approval. These performance measures and evaluations should be factored into the maintenance, feedback, and improvement of the ISMS as well.

Annually, the contractor is required to update the performance objectives, performance measures, and safety commitments. Each performance measure and commitment should be carefully analyzed and the results considered in the contractor annual budget guidance responses. Typically the following types of activities may be considered:

- Evaluate the effectiveness of the performance objectives, performance measures, and commitments. Determine reasons for success or failure of those commitments.
- Review occurrence reports and corrective actions for ISMS improvement opportunities.
- Review facility data and identify environment, safety, and health issues to develop improvements required in site ISMS.
- Review worker or operator suggestions from the Employee Concerns Program and employees' organizations.
- Review DOE program and budget execution guidance and direction.
- Review changes to laws, regulations, and directives.

As a part of the annual budget exercise, the contractor identifies the resources necessary to accomplish its commitments and to ensure the overall safe conduct of work (e.g., ES&H program functions and facility safety upgrades). Contractor safety commitments are to be consistent with the site annual work authorizing means.

When the contractor's SMS is annually updated, the update should document (1) contractor performance against the previous year's safety commitments; (2) contractor commitments designed to achieve safety performance objectives and performance measures for the upcoming fiscal year; and (3) resources necessary to meet ES&H program minimum requirements. Through this process, the ISMS annual update is responsive to DOE budget guidance and direction contained in the unified budget call, issued annually by the DOE Chief Financial Officer, and LPSO guidance. DOE P 450.5 and DOE O 414.1A require a rigorous and credible contractor self-assessment program linked to the ISMS, which includes elements that address the following: (1) performance measures and performance indicators, (2) line evaluations and independent evaluations, (3) compliance with applicable requirements, (4) data collection, analysis, and corrective actions, and (5) feedback and performance improvement.

A contractor's independent assessments can provide senior management with information concerning ISMS. Some sites have found an operational review board (Facility Evaluation Board) to be very useful in providing objective evidence concerning the status of implementation of ISMS.

Analysis of the aggregate information from these assessment and self-assessment activities within the framework of the expectations provided in section 4.4 of DOE G 450.4-1B should provide a clear indication of the status of the ISMS. Through this analysis, necessary areas of emphasis and potential improvements should be apparent.

The contractor should consider actions or changes to the system based on this information, such as

- corrective actions for functional ES&H program integration issues;
- corrective actions to improve ISMS implementation and effectiveness;
- performance measures and commitments for the next year;
- any changes required in a self-assessment and independent assessment focus or criteria;
- any changes, if required, to an ISMS description document; and
- impacts of any changes to laws, regulations, and directives.

The contractor determines if the ISM system and performance objectives, performance measures, and commitments need to be modified, updated, or otherwise revised in the scheduled review and approval process. The contractor reviews outstanding issues from previous ISMS verification reviews, from DOE EH-2 reviews and investigations, from current DOE and contractor assessments, from performance measures and performance indicators, and from recent DOE program reviews and inspections.

The contractor should use the results of this process to evaluate and improve the overall ISMS using a maintenance, feedback, and improvement process and should discuss the results with DOE. The contractor may also address all applicable topics in section 4.4 of DOE G 450.4-1B in preparing the budget submittal if the contracting officer has not scheduled a revision.

ISM implementation criteria have been developed as part of the verification process (see appendix A of the *ISMS Verification Team Leader's Handbook*) and remain useful as an evaluation tool on a continuing basis.

Additionally, DOE Secretarial offices and field offices will annually issue a declaration report of the status of implementation of ISM within that office, including applicable site and contractor operations. The DOE Secretarial offices must evaluate applicable DOE HQ and field office activities and applicable contractor activities, and the DOE field offices must evaluate applicable DOE field office activities and applicable contractor activities.

The report must include

- a summary of relevant activities and assessments that were completed during the year, including the basis for this determination;
- a determination of the overall effectiveness of implementation of ISM using the "Effective Performance," "Needs Improvement," or "Significant Weakness" summary evaluation;
- summary strengths, weaknesses, and opportunities for improvement;
- planned or ongoing actions to enhance ISM effectiveness;
- a discussion of potential site vulnerabilities to provide an opportunity to develop and implement risk management options and strategies, including re-scoping activities, re-allocating funds and resources to address the vulnerabilities, or identifying the consequences of proceeding without addressing them;
- a discussion of any changes in the authorization basis including special conditions or exceptions (which require signature approval of the CTA);
- any directive exemptions per changes in the contract during the year.

Annual ISM declarations must provide the bases for their conclusions. These bases should include the annual ISM effectiveness review, self-assessments, line oversight reviews, annual integrated ISM reviews, lower-level ISM reviews, pertinent feedback data from a variety of mechanisms, and action plans including corrective or compensatory actions to address weaknesses and opportunities for improvement.

For Secretarial offices, the annual ISM declarations must be provided to the applicable CTA or designated senior official. For field offices, annual ISM declarations must be provided to the applicable Secretarial office for review.

h. Describe the approach used to assess the effectiveness of the contractor's approved ISM System.

DOE Secretarial offices and field offices will perform an annual ISM effectiveness review to develop their annual ISM declarations. The annual ISM review will encompass a review of content and results of relevant self-assessments, line oversight, lower-level ISM reviews, and the annual integrated review; performance against the past year's safety performance objectives, measures, and commitments; and pertinent feedback data from a variety of relevant mechanisms.

The following continuing core expectation (CCE) statements are a compendium of relevant topics that can be used to aid in maintaining an ISM system and in developing an evaluation of the effectiveness of the ISM system. These can be used to guide annual effectiveness reviews or ISM verification reviews. This listing may be used by contractors and DOE.

- CCE-1. The contractor updates the safety performance objectives, performance measures, and commitments, in response to DOE direction and guidance so that they reflect and promote continual improvement and address major mission changes, as required. The ISM system description is updated and submitted for approval as scheduled by the contracting officer.
- CCE-2. System effectiveness, evaluated as described in the contractor's ISM system description, is satisfactory. Safety performance objectives, measures, and commitments are met or exceeded, and they are revised as appropriate for the next year.
- CCE-3. Work activities reflect effective implementation of the functions of the ISM system. Work is defined. Hazards are identified. Actions to prevent or eliminate the hazards are taken. Controls are developed and implemented. Work is properly authorized. Work is accomplished within controls. Appropriate worker involvement is a priority.
- CCE-4. Contractor and DOE implementing mechanisms are established and implemented to provide an effective environment for ISM implementation, as embodied in the ISM guiding principles and supplemental safety culture elements. Roles and responsibilities are clear. Line management is responsible for safety. Required competence is commensurate with responsibilities and the technical and safety system knowledge of managers and staff continues to improve.
- CCE-5. Contractor and DOE budget processes ensure that priorities are balanced. Budget development and change control processes ensure that safety is balanced with production. Facility procedures ensure that production is balanced with safety.

- CCE-6. An effective feedback and improvement process, using progressively more demanding criteria, is functioning at each level of the organization from the worker and individual activities through the facilities and the site, including the ISM feedback and improvement process used by and within DOE. The requirements of DOE O 226.1 are implemented. Issues management is effective so that issues are identified, evaluated, and closed. Issues identified in annual ISM effectiveness reviews and ISM system verifications are effectively addressed.
- CCE-7. List A/List B is reviewed and updated as necessary, at least annually and concurrent with the budget cycle. The process for effecting changes to the standards and requirements identified in the contract per DEAR List A and List B is being used and is effective. Authorization agreements and authorization basis documents are maintained current. Changes in agreed upon standards and requirements are included to reflect mission changes. An effective, dynamic process to keep standards and requirements current is apparent.
- CCE-8. Relevant performance records reflect an improving ISM system. Records include routine DOE and contractor self-assessment reports, independent and focused assessment reports, incident investigations, occurrence reports, DOE PAAA enforcement action reports, information regarding enforcement activity conducted by external state and Federal safety agencies, and other relevant documentation that provides evidence as to the status of the implementation, integration, and effectiveness of the ISM system. Feedback, improvement, and change control of the contractor ISM system description is in place and is effective.
- CCE-9. DOE ISM system procedures and mechanisms are in place to ensure that work is formally and appropriately authorized and performed safely in a manner that protects the public, workers, and environment from harm. DOE line managers are involved in the review of safety issues and concerns and have an active role in authorizing operations.
- CCE-10. DOE ISM system procedures and mechanisms are in place to ensure that hazards are analyzed, actions to prevent or eliminate the hazards are taken, controls are developed, and feedback and improvement programs are in place and are effective. DOE line managers are using these processes effectively, consistent with the DOE field office FRA and DOE FRAM requirements. DOE ISM system procedures and mechanisms integrate ISM with QA, EMS, and other management systems.

References: DOE M 450.4-1

i. Discuss the process used to develop and approve contractor annual ISM performance objectives, measures, and commitments.

The purpose of safety performance objectives, measures, and commitments is to drive improvement in safety performance and ISM system effectiveness. Performance objectives can be long-term management system goals or specific management objectives or deficiencies that need to be addressed. They may be driven by strategic planning processes or safety goals processes (via DOE P 450.7). Performance objectives are expected to remain relatively unchanged over multiple years, with a bias toward continuously rising standards of performance. Improving performance is expected over the long term.

Performance commitments are specific actions that will be taken during a specific year to further achievement of long-term performance objectives. Commitments are steps that will be funded to move toward accomplishment of the performance objectives. Performance commitments would be expected to address significant identified weaknesses or areas of improvement. These may include either major corrective actions or major improvement actions.

Performance measures are used to track progress and monitor achievement of performance objectives and commitments. The most useful performance measures provide information that directly reflects how safely the operational work is being performed. A combination of leading (process or behavioral) and lagging (outcome or results) indicators is desirable. The measures are changed as necessary to address the performance objectives, significant identified weaknesses, and areas for improvement. Annual performance expectations should be established for most of these measures.

Performance objectives, measures, and commitments are developed based on numerous considerations including the budget process. This approach to continuous improvement recognizes the need for investment in improvement. The ISM guiding principle, Balanced Priorities, must be considered in developing appropriate performance objectives, measures, and commitments.

Secretarial office ISM system descriptions should describe how ISM performance is measured and may provide a standard set of ISM performance indicators. This should be included in the section on ISM system performance objectives, measures, and commitments, and should be updated annually.

References: DOE M 450.4-1

Mandatory Performance Activities:

a. Lead or participate in an assessment of a site or facility's implementation of Integrated Safety Management.

Note: Although this element is performance based and the Qualifying Official will evaluate its completion, the following information is provided to assist a candidate in assessing site or facility implementation of the ISMS.

DOE-HDBK-3027-99, *Integrated Safety Management Systems (ISMS) Verification Team Leader's Handbook*, provides guidance to an ISMS verification team leader and the verification team in conducting ISMS verifications. This handbook describes the methods and approaches to

- develop the scope of the phase I and phase II review processes to be consistent with the history, hazards, and complexity of the site, facility, or activity;
- develop procedures for the conduct of the phase I review, validating that the ISMS documentation satisfies the DEAR clause as amplified in DOE Policy 450.4 and associated guidance and that DOE can effectively execute responsibilities as described in the FRAM; develop procedures for the conduct of the phase II review,

validating that the description approved by the approval authority, following or concurrent with the phase I review, has been implemented; and
- describe a methodology by which the DOE ISMS verification teams will be advised, trained, and/or mentored to conduct subsequent ISMS verifications.

This handbook provides proven approaches and methodologies for the review of the ISMS descriptions provided by contractors.

5. An STSM shall have a working level knowledge of the DOE Principles of Human Performance Improvement described in the Human Performance Fundamentals Course (National Academy for Nuclear Training).

a. Explain the significance of human error in the incidences of occurrences and events.

DOE M 450.4-1, *Integrated Safety Management System Manual*, provides the following definition: "Human Performance Improvement is fundamentally about reducing errors and managing defenses. Striving for excellence in human performance is an ongoing effort to significantly reduce events caused by human error. Human error is caused by a variety of conditions related to individual behavior, management and leadership practices, and organizational processes and values. Behaviors at all levels need alignment to improve individual performance, reduce errors and prevent events. Alignment involves facilitating organizational processes and values to support desired behaviors."

NUREG/CR-6751, "The Human Performance Evaluation Process: A Resource for Reviewing the Identification and Resolution of Human Performance Problems," states that human errors may play several different roles in an event sequence. An error may
- directly cause an event;
- contribute to an event by setting up the conditions that, in combination with other events or conditions, allowed the event to occur (e.g., leaving a valve open that should be closed);
- make the consequences of an event more severe;
- delay recovery from an event.

Human errors typically contribute to events rather than directly cause them. In fact, a single human error directly causes very few significant events because most systems that involve nuclear processes are designed to be fault tolerant; that is, they are designed to prevent a single human action (or failure to act) from causing an event with important consequences. More often, a risk-significant event involves several system deficiencies, some of which may have happened long before the event takes place. For example, errors in the original installation of a system may set the stage for another human error to initiate an event months or years later. The value of investigating the human errors involved in an event is to understand what caused them so that corrective actions can be developed to minimize the likelihood of recurrence.

It is also important to detect and correct patterns of errors before they result in an event. Human performance trends are patterns of related errors resulting from the same causal factors. Although most errors that are made day to day have no immediate impact on safe operations, an adverse human performance trend may contribute to an overall increase in risk to the public. For example, a pattern of related errors may systematically degrade the

reliability of a class of components (e.g., miscalibration errors), or the errors may be committed in the wrong combination of circumstances and cause an event.

In most cases, the causes of errors that occur in an event or as part of a trend (collectively referred to here as human performance problems) can be traced to weaknesses in the programs, policies, and practices that organizations use to increase the reliability of human performance in their operations. Examples include training and qualification programs; the fitness-for-duty program; programs to develop and validate procedures; work planning and control processes; overtime policies; and structured methods for communicating important information, such as for a shift turnover. Programmatic weaknesses are often found to be the root causes of human performance problems.

b. Name three of the five principles of human performance and provide a workplace example of each principle in action.

INPO's *Excellence in Human Performance Initiative 2001* identified the key principles in developing an appropriate safety culture to improve human performance. Excellence in human performance is more likely when both workers and managers embrace the following principles:

- People are fallible, and even well-trained and experienced staff can make mistakes.
- Error-likely situations are predictable, manageable, and avoidable.
- Individual behavior is influenced by organizational processes and values.
- People achieve high levels of performance based largely on the encouragement and reinforcement received from their leaders, peers, and subordinates.
- Most accidents can be avoided by understanding the reasons mistakes occur and applying the lessons learned from past events.

Specific workplace examples will be evaluated based on merit by the Qualifying Official.

c. Explain how individual behavior affects the frequency and severity of an occurrence or an event.

Individual behavior can be affected by hazardous attitudes that are

- prideful — excessively high opinion of one's ability
- heroic — exaggerated sense of courage and aggressiveness
- invulnerable — immunity to error, failure, or injury
- fatalistic — belief that all things are predetermined or inevitable
- summit-feverish — zeal to finish the nearer one gets to a goal
- Pollyannaish — all is well in the world; nothing can go wrong

Minimizing human performance errors is essential to reducing the frequency and severity of events. To progress toward excellent human performance, a work environment must exist in which workers, leaders, and the organization routinely exhibit behaviors that promote event-free operations. Management establishes and reinforces operational practices to promote event-free performance. The INPO document *Excellence in Human Performance* describes individual, leadership, and organizational behavior characteristics that have proven successful in promoting excellence in human performance. Examples of practices that may be beneficial in enhancing operations include the following:

- Convey an attitude of trust and an approach that supports teamwork at all levels. Actively solicit, listen to, and (if acceptable) act upon workers' ideas for improving individual and organizational performance.
- Encourage communication and teamwork among groups that operate, maintain, and support the facility.
- Establish administrative practices that reinforce desired behaviors.
- Clearly communicate to all personnel the expectations for conducting work and reporting errors.

d. Given an accident scenario, explain how latent errors in the organization affect the active errors and mistakes that lead to an accident.

Note: Although this element is performance based and the Qualifying Official will evaluate its completion, the following information is provided to assist in identifying latent organizational errors in an accident scenario.

The INPO document *Anatomy of an Event* defines latent organizational weakness as hidden deficiencies in management control processes (e.g., strategy, policies, work control, training, and resource allocation) or values (shared beliefs, attitudes, norms, and assumptions) creating workplace conditions that can provoke error (precursors) and degrade the integrity of defenses (flawed defenses).

Process weakness examples are work control, training, accountability policy, reviews and approval, equipment design, procedure development, and human resources. Value weakness examples are priorities, measures and controls, critical incidents, coaching and teamwork, rewards and sanctions, reinforcement, and promotions and terminations.

DOE M 450.4-1, *Integrated Safety Management System Manual*, defines latent organizational weakness as loopholes in the system's defenses, barriers, and safeguards whose potential existed for some time prior to the onset of the accident sequence, though usually without any obvious bad effect. These loopholes consist of imperfections in features such as leadership/supervision, training and qualification, report of defects, engineered safety features, safety procedures, and hazard identification and evaluation. Most accidents originate from, or are propagated by, latent weaknesses.

NUREG/CR-6751, "The Human Performance Evaluation Process: A Resource for Reviewing the Identification and Resolution of Human Performance Problems," states that the root cause of an error is often found in programmatic weaknesses. Programs comprise policies (both formal and informal), organizational processes, and procedures that define management expectations for how work is to be performed. If there is a flaw in one of the programs responsible for maintaining safe operations, that flaw will create conditions that may result in a vulnerability to events caused by the programmatic flaw. Programmatic weaknesses are often found to be the cause of negative human performance trends. Programmatic weaknesses are synonymous with organizational weaknesses.

6. An STSM shall have a working level knowledge of the content of the safety basis requirements, as described in 10 Code of Federal Regulations (CFR) 830, Subpart B, and the related DOE orders, standards, and guides.

a. Discuss the purpose and objectives of the nuclear facility safety basis program.

Title 10 CFR 830, subpart B, Safety Basis Requirements, requires the contractor responsible for a DOE nuclear facility to analyze the facility, the work to be performed, and the associated hazards, and to identify the conditions, safe boundaries, and hazard controls necessary to protect workers, the public, and the environment from adverse consequences. These analyses and hazard controls constitute the safety basis upon which the contractor and DOE rely to conclude that the facility can be operated safely. Performing work consistent with the safety basis provides reasonable assurance of adequate protection of workers, the public, and the environment.

b. Discuss each of the following nuclear safety Orders, standards, Guides, and handbooks and relate each of them to establishing and maintaining the safety basis requirements for a given facility:

- **DOE O 420.1A, Facility Safety;**
- **DOE G 421.1-2, Implementation Guide for Use in Developing Documented Safety Analyses to Meet Subpart B of 10 CFR 830;**
- **DOE G 423.1-1, Implementation Guide for Use in Developing Technical Safety Requirements;**
- **DOE G 424.1-1, Implementation Guide for Use in Addressing Unreviewed Safety Question Requirements;**
- **DOE O 425.1C, Startup and Restart of Nuclear Facilities;**
- **DOE O 460.1B, Packaging and Transportation Safety;**
- **DOE G 460.1-1, Implementation Guide for Use with DOE O 460.1A, Packaging and Transportation Safety;**
- **DOE-STD-1020-2002, Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities;**
- **DOE-STD-1021-93, Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components [SSCs];**
- **DOE-STD-1022-94, Natural Phenomena Hazards Characterization Criteria**
- **DOE-STD-1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports [SAR];**
- **DOE-STD-1083-95, Requesting and Granting Exemptions to Nuclear Safety Rules;**
- **DOE-STD-1104-96, Review and Approval of Nonreactor Nuclear Facility Safety Analysis Reports;**
- **DOE-STD-1120-2005, Integration of Environment, Safety, and Health into Facility Disposition Activities, Volumes 1 and 2;**
- **DOE-STD-1186-2004, Specific Administrative Controls;**
- **DOE-STD-3009-94, Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Safety Analysis Reports;**
- **DOE-HDBK-3010-94, Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities;**
- **DOE-STD-3011-2002, Guidance for Preparation of Basis for Interim Operation (BIO) Documents;**
- **DOE-EM-STD-5502-94, Hazard Baseline Documentation;**
- **10 CFR 820, Procedural Rules for DOE Nuclear Activities; and**
- **10 CFR 830, Subpart B, Safety Basis Requirements.**

A brief synopsis of each document follows.

DOE O 420.1A, Facility Safety

Objective

The objective of this Order is to establish facility safety requirements related to nuclear safety design, criticality safety, fire protection, and natural phenomena hazards mitigation.

Introduction

This Order includes requirements for nuclear and explosives safety design criteria, fire protection, nuclear criticality safety, natural phenomena hazards mitigation, and the system engineer program. The Order also includes a list of positional responsibilities associated with these requirements. Finally, the Order establishes contractor requirements in a contractor requirements document.

[Note: DOE O 420.1A, *Facility Safety,* was archived and superseded by DOE O 420.1B.]

DOE G 421.1-2, Implementation Guide for Use in Developing Documented Safety Analyses to Meet Subpart B of 10 CFR 830

Purpose

This Guide was developed in support of 10 CFR 830, subpart B, "Safety Basis Requirements," and provides guidance in meeting the provisions for documented safety analyses (DSAs) defined in that subpart.

Introduction

Title 10 CFR 830, subpart B, "Safety Basis Requirements," requires the contractor responsible for a DOE nuclear facility to analyze the facility, the work to be performed, and the associated hazards and to identify the conditions, safe boundaries, and hazard controls necessary to protect workers, the public, and the environment from adverse consequences. These analyses and hazard controls constitute the safety basis upon which the contractor and DOE rely to conclude that the facility can be operated safely. Performing work consistent with the safety basis provides reasonable assurance of adequate protection of workers, the public, and the environment.

DOE G 423.1-1, Implementation Guide for Use in Developing Technical Safety Requirements

Purpose

This Guide provides elaboration on the content of TSRs. Section 10 CFR 830.205 of the nuclear safety management rule requires DOE contractors responsible for category 1, 2, and 3 DOE nuclear facilities to develop TSRs. These TSRs identify the limitations of each DOE-owned, contractor-operated nuclear facility based on the DSA and any additional safety requirements established for the facility.

Introduction

The TSR rule requires contractors to prepare and submit TSRs for DOE approval. This Guide provides guidance in identifying important safety parameters and developing the content for the TSRs that are required by 10 CFR 830.205.

The appendix to subpart B of the nuclear safety management rule specifies the types of safety limits, operating limits, surveillance requirements, and administrative controls that define the safety envelope necessary to protect the health and safety of the public and workers. The TSR derivation chapter in the DSA is the key component that provides the basis for TSRs.

DOE G 424.1-1, Implementation Guide for Use in Addressing Unreviewed Safety Question Requirements

Purpose

This Guide provides information to assist in the implementation and interpretation of title 10 CFR 830.203, "Unreviewed Safety Question Process," of the nuclear safety management rules for applicable nuclear facilities owned or operated by DOE, including the NNSA.

Introduction

Section 830.203, "Unreviewed Safety Question Process," allows contractors to make physical and procedural changes and to conduct tests and experiments without prior DOE approval if the proposed change can be accommodated within the existing safety basis. The contractor must carefully evaluate any proposed change to ensure that it will not explicitly or implicitly affect the safety basis of the facility. The unreviewed safety question (USQ) process is primarily applicable to the DSA. Although the rule only references the DSA, the DSA must include the conditions of approval in safety evaluation reports, as well as facility-specific commitments made in compliance with DOE rules, Orders, or Policies. Because application of the USQ process depends on facility-specific information, results of a USQ determination in one facility generally cannot be extrapolated to other facilities. DOE approval of the procedure to implement the USQ process is required by 10 CFR 830.203.

[Note: DOE G 424.1-1, *Implementation Guide for Use in Addressing Unreviewed Safety Question Requirements* was archived and superseded by DOE G 424.1-1A.]

DOE O 425.1C, Startup and Restart of Nuclear Facilities

Purpose

The objective of this Order is to establish the requirements for the DOE, including the NNSA, for startup of new nuclear facilities and for the restart of existing nuclear facilities that have been shut down.

Introduction

DOE line management must ensure that contractor management determines if operational readiness reviews (ORRs) are required for startup or restart of nuclear facilities. DOE must also conduct an ORR and ensure that contractors conduct an ORR in accordance with this Order.

DOE O 460.1B, Packaging and Transportation Safety

Purpose

The purpose of this Order is to establish safety requirements for the proper packaging and transportation of DOE/NNSA offsite shipments and onsite transfers of hazardous materials and for modal transport.

Introduction

This Order establishes standards of safety that provide an acceptable level of control of the radiation, criticality, and thermal hazards to persons, property, and the environment that are associated with the transport of radioactive material.

DOE G 460.1-1, Implementation Guide for Use with DOE O 460.1A, Packaging and Transportation Safety

Purpose

This Guide provides information concerning the use of current principles and practices, including regulatory guidance from the U.S. Department of Transportation and the U.S. Nuclear Regulatory Commission, where available, to establish and implement effective packaging and transportation safety programs. The intent of this Guide is to aid in the development of implementation plans to effectively carry out the requirements and responsibilities of DOE O 460.1B, *Packaging and Transportation Safety*, which replaced DOE O 460.1A.

Introduction

This Guide supplements DOE O 460.1B, *Packaging and Transportation Safety*, April 4, 2003, by providing clarifying material for the implementation of packaging and transportation safety of hazardous materials. DOE O 460.1B replaces DOE O 460.1A, which replaced DOE Order 1540.2, *Hazardous Material Packaging for Transport Administrative Procedures*, September 30, 1986, and DOE Order 5480.3, *Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes*, July 9, 1985, and contains new requirements for onsite safety and motor carrier safety. In addition, DOE O 460.1B includes aviation safety, pipeline safety, and international packaging and transportation regulations.

DOE-STD-1020-2002, Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities

Purpose

This standard provides information to help meet the requirements of 10 CFR 830, "Nuclear Safety Management", DOE O 420.1A, and its associated Guides, accounting for cancellation of DOE Order 6430.1A and updating this standard to most current references. This standard has also been brought up-to-date to match the requirements of current model building codes such as IBC 2000 and current industry standards.

Introduction

DOE has issued DOE O 420.1B that establishes policy for its facilities in the event of natural phenomena hazards (NPH) along with associated NPH mitigation requirements. This DOE standard gives design and evaluation criteria for NPH effects as guidance for implementing the NPH mitigation requirements of DOE O 420.1B and the associated Guides. These are intended to be consistent design and evaluation criteria for protection against natural phenomena hazards at DOE sites throughout the United States. The goal of these criteria is to ensure that DOE facilities can withstand the effects of natural phenomena such as earthquakes, extreme winds, tornadoes, and flooding. These criteria apply to the design of new facilities and the evaluation of existing facilities. They may also be used for modification and upgrading of existing facilities, as appropriate. It is recognized that it is

likely not cost-effective to upgrade existing facilities which do not meet these criteria by a small margin. Hence, flexibility in the criteria for existing facilities is provided by permitting limited relief from the criteria for new design. The intended audience is primarily the civil/structural or mechanical engineers familiar with building code methods who are conducting the design or evaluation of DOE facilities.

DOE-STD-1021-93, Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components (SSCs)

Purpose

The purpose of this standard is to provide, for the purpose of NPH design and evaluation, criteria for selecting performance categories of SSCs in accordance with the requirements specified in DOE O 420.1B and the NPH guide to DOE O 420.1B (DOE G 420.1-2).

Introduction

This standard provides guidelines to be used for NPH performance categorization of SSCs, and recommends systematic procedures to implement these guidelines. It applies to all DOE facilities that are covered by DOE O 420.1B. Title 10 CFR 830 requires the use of a graded approach in performing safety analyses and evaluations of DOE facilities for normal operating and accident conditions, including accidents caused by NPH events. The NPH guide to DOE O 420.1B (DOE G 420.1-2) uses this graded approach and requires, for the purpose of NPH design and evaluation, placing the SSCs comprising the DOE facilities into five NPH performance categories. NPH performance categorization guidelines provided in this technical standard are based on the system safety classification and hazard categorization/classification data obtained from the application of 10 CFR 830, DOE-STD-3009-94, and DOE-STD-1027-92, Guidance on Preliminary Hazard Classification and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports.

[Note: DOE-STD-1021-93 was changed and reaffirmed to reflect the deletion of "[SSC]" from the title. The remainder of the title remains unchanged.]

DOE-STD-1022-94, Natural Phenomena Hazards Characterization Criteria

Purpose

The purpose of this standard is to provide criteria for site characterization that provides site-specific information that is needed for implementing DOE O 420.1B requirements. Additionally, the purpose of this standard is to develop a site-wide database related to NPH that should be used to support individual safety analyses.

Introduction

The studies of site characteristics should be performed and existing data for site characteristics related to NPH should be evaluated in accordance with this standard. The site characterization provides the necessary site-specific information to implement DOE-STD-1023-95, *Natural Phenomena Hazards Assessment Criteria*, which provides criteria for hazard assessment to ensure that adequate design-basis load levels are established. DOE-STD-1023-95 in turn provides necessary information to implement DOE-STD-1020-2002 for NPH design and evaluation criteria for DOE facilities.

[Note: DOE-STD-1022-94 was changed, renamed, and reaffirmed. The new title is *Natural Phenomena Hazards Site Characterization Criteria.*]

DOE-STD-1027-92, Guidance on Preliminary Hazard Classification and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports

Purpose

The purpose of this DOE standard is to establish guidance for the preparation and review of hazard categorization and accident analysis techniques, as required in DOE Order 5480.23, *Nuclear Safety Analysis Reports*.

Introduction

This standard provides specific guidance on several of the requirements contained in DOE Order 5480.23, *Nuclear Safety Analysis Reports*. Section 1 establishes the threshold quantities of hazardous materials that if exceeded, would mandate the development of a SAR under the Order. Section 2 discusses the SAR upgrade plan and schedule that must be submitted to each Secretarial Officer. Section 3 provides a uniform methodology for hazard categorization. Section 4 gives additional specific guidance on the use of the graded approach and accident/hazard analysis techniques for compliance with the Order.

[Note: DOE-STD-1027-92 was changed to reflect the removal of "SAR" from the end of the title. The rest of the title remains as shown above.]

DOE-STD-1083-95, Requesting and Granting Exemptions to Nuclear Safety Rules

Purpose

This standard provides an acceptable process for requesting and granting exemptions to DOE nuclear safety rules.

Introduction

DOE may grant temporary or permanent exemptions to its nuclear safety rules provided that the provisions of 10 CFR 820, subpart E, "Exemption Relief," are met. The provisions of 10 CFR 820 state that the Secretarial Officer should use any procedures deemed necessary and appropriate to comply with the exemption responsibilities. This standard establishes an acceptable procedure to be used to request and grant exemptions to DOE nuclear safety rules in accordance with 10 CFR 820.

DOE-STD-1104-96, Review and Approval of Nonreactor Nuclear Facility Safety Analysis Reports

Purpose

This standard was prepared to be consistent with the 10 CFR 830 rule and its implementation guides and should be used in conjunction with the rule and its implementation guides.

Introduction

Safety and health assurance may be increased by standardizing the process of reviewing and approving DSAs and TSRs. Although complete standardization of the process requires substantial commitments and is complicated by the diversity of facility operations throughout the DOE complex, certain benefits are gained by standardizing fundamental elements of the

review and approval process. To that end, this standard establishes DOE guidelines for the review and approval of these documents.

[Note: DOE-STD-1104-96 was changed to reflect the new title *Review and Approval of Nuclear Facility Safety Basis Documents (Documented Safety Analyses and Technical Safety Requirements)*.]

DOE-STD-1120-2005, Integration of Environment, Safety, and Health into Facility Disposition Activities, Volumes 1 and 2

Volume 1 of DOE-STD-1120-2005 has been revised to provide a DOE-approved methodology for preparing a DSA for decommissioning of nuclear facilities, as well as environmental restoration activities that involve work not done within a permanent structure.

Volume 2 of DOE-STD-1120-2005 is much broader in scope than volume 1 and satisfies several purposes. Integrated safety management expectations are provided in accordance with facility disposition requirements contained in DOE O 430.1B, *Real Property Asset Management*. The collection of appendices in volume 2 also provides additional guidance that supplements various practices described in volume 1.

Introduction

Volume 1, Documented Safety Analysis for Decommissioning and Environmental Restoration Projects, has four sections:

1. Introduction
2. Guidance on general safety basis concepts that have a direct or indirect impact on the DSA
3. Guidance on preparing DSAs and TSRs that are compliant with 10 CFR 830, subpart B requirements, and associated methodology for decommissioning of a nuclear facility
4. Guidance on preparing DSAs and TSRs that are compliant with 10 CFR 830, subpart B requirements, and associated methodology for environmental restoration activities involving work not performed within a permanent structure

Volume 2, "Appendices," complements other sections of DOE-STD-1120-2005 with additional ES&H information:

- Appendix A provides a set of candidate DOE ES&H directives and external regulations (organized by hazard types) that may be used to identify potentially applicable directives to a specific facility disposition activity.
- Appendix B offers examples and lessons learned that illustrate implementation of ES&H approaches discussed in section 3 of volume 1.
- Appendix C contains ISM guidance that applies to all facility disposition projects.
- Appendix D provides supplemental safety basis guidance related to inactive waste sites.
- Appendix E provides example risk binning guidelines that can be used to support control selection.
- Appendix F provides guidance for readiness evaluations.

DOE-STD-1186-2004, Specific Administrative Controls

Purpose

This technical standard clarifies and focuses existing requirements and guidance for the development and implementation of ACs relied on to perform specific safety functions of importance similar to those of safety SSCs. To focus attention on the unique issues associated with this type of AC, this Standard introduces a classification of AC to be known as a Specific AC (SAC). An SAC exists when an AC

- is identified in the Documented Safety Analysis (DSA) as a control needed to prevent or mitigate an accident scenario; and
- has a safety function that would be SS or SC if the function were provided by an SSC.

Introduction

When a specific-action AC is elevated to the class of SAC, the guidance of DOE-STD-1186-2004 should be used to enhance assurance of the effectiveness and dependability of this AC beyond that which might be experienced if the specific-action AC were simply to be implemented under the auspices of a safety management program.

Section 1 introduces the concept of SACs and relates this to the existing requirements for derivation of safety bases, including hazard analyses, identification of hazard controls, derivation of TSRs, and the role of ACs in the TSR. Section 1 also describes the general expectations for the formulation, implementation, and maintenance of ACs.

Section 2 provides guidance for criteria used to classify ACs as SACs, the application of the safety approach from DOE O 420.1B, *Facility Safety*, to SACs, and how SACs are formulated, implemented, and maintained.

Section 3 provides guidance on measures that should be used to improve the dependability of SACs.

Section 4 provides guidance on the formats for treatment of SACs in TSRs.

Section 5 discusses causal and failure analyses as applied to SACs.

Section 6 presents TSR examples.

DOE-STD-3009-94, Preparation Guide for DOE Nonreactor Nuclear Facility Safety Analysis Reports

Purpose

This standard describes a DSA preparation method that is acceptable to the DOE. It was developed to assist hazard category 2 and 3 facilities in preparing SARs that will satisfy the requirements of 10 CFR 830. Hazard category 1 facilities are typically expected to be category A reactors for which extensive precedents for SARs already exist.

Guidance provided by this standard is generally applicable to any facility that is required to document its safety basis in accordance with 10 CFR 830, "Nuclear Safety Management." For new facilities in which conceptual design or construction activities are in progress, elements of this guidance may be more appropriately handled as an integral part of the

overall design requirements. The methodology provided by this standard focuses more on characterizing facility safety with or without well-documented information than on the determination of facility design. Accordingly, contractors for facilities that are documenting conceptual designs for preliminary DSA should apply the process and format of this standard to the extent it is judged to be of benefit.

Beyond conceptual design and construction, the methodology in this standard is applicable to the spectrum of missions expected to occur over the lifetime of a facility. As the phases of facility life change, suitable methodology is provided for use in updating an existing DSA and in developing a new DSA if the new mission is no longer adequately encompassed by the existing DSA. This integration of the DSA with changes in facility mission and associated updates should be controlled as part of an overall safety management plan.

Introduction

This standard addresses the following tasks related to implementing the requirements of 10 CFR 830:

- Ensures consistent and appropriate treatment of all DSA requirements for the variety of DOE nonreactor nuclear facilities.
- Provides final facility hazard categorization and considers and incorporates the categorization into programmatic requirement measures to protect workers, the public, and the environment from hazardous and accident conditions. TSRs and safety-significant SSCs that are major contributors to worker safety and defense in depth are identified in the hazard analysis.
- Designates safety-class SSCs and safety controls as a function of the evaluation guideline.
- Provides a consistent and measured treatment of the application of the graded approach, including guidance on the minimum acceptable DSA content.

[Note: DOE-STD-3009-94 was changed to reflect a new title of *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*]

DOE-HDBK-3010-94, Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities

Purpose

The purpose of this document is to provide a compendium and analysis of experimental data from which airborne release fractions and respirable fractions may be derived. Such values are needed to determine quantities of radioactive material driven airborne to estimate the scope of the potential release spectrum and potential downwind consequences from a given facility or activity. The information provided in this handbook aids in making such estimates.

Introduction

The handbook discusses the following major topics:

- Source term formula: provides a computational formula for using the information gained from analysis.
- Applicability of data: distinguishes proper use of information.
- Accident stresses: identifies the types of accident conditions for which this information is applicable.

- Handbook organization: explains the presentation of information and the use of examples.

The data in the handbook can be used in a variety of applications, such as safety and environmental analyses, and to provide information relevant to system and experiment design. However, the data and the analyses of the data contained therein need to be critically evaluated for applicability in each situation in which they are used, and represent only one source of information in a complete safety analysis or design process.

DOE-STD-3011-2002, Guidance for Preparation of Basis for Interim Operation (BIO) Documents

Purpose

This standard provides guidance for the development of basis for interim operation (BIO) documents, which are an acceptable form of DSA under the provision of the 10 CFR 830 Rule.

Introduction

DOE-STD-3011-2002 provides a DOE-approved methodology for preparing a BIO document. DOE-STD-3011-2002 supplements the information in DOE G 421.1-2, *Implementation Guide for Use in Developing Documented Safety Analyses to Meet Subpart B of 10 CFR 830*.

DOE-EM-STD-5502-94, Hazard Baseline Documentation

[Note: This standard has been cancelled. There is no replacement.]

10 CFR 820, Procedural Rules for DOE Nuclear Activities

Purpose

DOE has adopted procedural rules in 10 CFR 820 to provide for the enforcement of violations of DOE nuclear safety requirements for which civil and criminal penalties can be imposed under the Price-Anderson Amendments Act of 1988.

Introduction

The regulation provides criteria and procedures to protect employees of DOE contractors who believe they have suffered retaliation for disclosing information concerning danger to public health or safety, substantial violations of law, fraud or gross mismanagement; for participating in congressional proceedings; or for refusing to participate in dangerous activities.

10 CFR 830, Subpart B, Safety Basis Requirements

Purpose

This subpart establishes safety basis requirements for hazard category 1, 2, and 3 DOE nuclear facilities.

Introduction

In establishing the safety basis for a hazard category 1, 2, or 3 DOE nuclear facility, the contractor responsible for the facility must

- define the scope of the work to be performed;
- identify and analyze the hazards associated with the work;
- categorize the facility consistent with DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, change notice 1, September 1997;
- prepare a documented safety analysis for the facility;
- establish the hazard controls upon which the contractor will rely to ensure adequate protection of workers, the public, and the environment.

c. Discuss the development and maintenance of the requirements described in 10 CFR 830, Subpart B, Safety Basis Requirements, for DOE and contractors authorized to operate nuclear facilities.

In developing the safety basis for a hazard category 1, 2, or 3 DOE nuclear facility, the contractor responsible for the facility must

- define the scope of the work to be performed;
- identify and analyze the hazards associated with the work;
- categorize the facility consistent with DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, change notice 1, September 1997;
- prepare a documented safety analysis for the facility; and
- establish the hazard controls upon which the contractor will rely to ensure adequate protection of workers, the public, and the environment.

In maintaining the safety basis for a hazard category 1, 2, or 3 DOE nuclear facility, the contractor responsible for the facility must

- update the safety basis to keep it current and to reflect changes in the facility, the work and the hazards as they are analyzed in the documented safety analysis;
- annually submit to DOE either the updated documented safety analysis for approval or a letter stating that there have been no changes in the documented safety analysis since the prior submission;
- incorporate in the safety basis any changes, conditions, or hazard controls directed by DOE.

d. Discuss the following items in the context of safe operation of a nuclear facility:

- **Authorization Agreements;**
- **Authorization Basis;**
- **Documented Safety Analysis;**
- **Fire Hazard Analysis;**
- **Graded approach;**
- **Limiting conditions for operation;**
- **Limiting control setting;**
- **Operational Readiness Review;**
- **Preliminary Documented Safety Analysis;**
- **Potential Inadequacies of the Safety Analysis (PISA);**
- **Readiness Assessment**

- **Safety Significant Components;**
- **Safe Harbor Methodologies**
- **Safety Analysis Report for Packaging;**
- **Safety Basis;**
- **Safety Class Components (SSCs);**
- **Safety Evaluation Report;**
- **Safety limit;**
- **Safety Significant SSCs;**
- **Shipper Receiver Agreements;**
- **Specific Administrative Controls;**
- **Startup Notification Report;**
- **Surveillance requirements;**
- **TSR;**
- **Design Basis; and**
- **USQ process.**

Authorization Agreements

Authorization agreements are documented agreements between DOE and the contractor for high-hazard facilities (category 1 and 2), incorporating the results of DOE's review of the contractor's proposed authorization basis for a defined scope of work. The authorization agreement contains key terms and conditions under which the contractor is authorized to perform the work. Any changes to these terms and conditions would require DOE approval.

The need for an authorization agreement will depend on the organization and adequacy of the existing, contractually binding documentation containing key terms and conditions. For example, at sites or facilities that have S/RIDs in place, it would be undesirable to duplicate the S/RID commitments in an authorization agreement. If an authorization agreement were required, it could simply reference the S/RIDs. The Department and the contractor should ensure that the ISMS includes procedural mechanisms that trigger a review to determine the necessity of having, revising, or eliminating an authorization agreement.

The authorization agreement may serve a number of purposes:

- To incorporate the results of DOE's review of the contractor's proposed authorization basis for a defined scope of work
- To define key terms and conditions (controls and commitments) under which the contractor is authorized to perform work; these key terms and conditions must be clearly identified in the agreement and any changes to these key terms and conditions would require DOE approval
- To delineate the key references DOE will approve versus that information that will simply be reviewed for information
- To consolidate the basis for a DOE determination to authorize operations by combining key DOE and contractor authorization basis and assessment documentation into one document
- To minimize the amount of correspondence required between the contractor and the Department when agreements for routine tasks and activities, requiring approval at certain unique facilities, can be approved once

Authorization agreements have also proved beneficial to DOE and contractors for facilities being affected by significant changes in mission, those requiring significant upgrade for their authorization bases, and those undergoing decontamination and decommissioning.

Authorization Basis

The authorization basis is the safety documentation supporting the decision to allow a process or facility to operate. Included are corporate operational and environmental requirements as found in regulations and specific permits, and, for specific activities, work packages or job safety analyses.

Documented Safety Analysis

A DSA is the process whereby facility hazards are identified, controls to prevent and mitigate potential accidents involving those hazards are proposed, and commitments are made for design, construction, operation, and disposition to assure adequate safety at DOE nuclear facilities.

Fire Hazard Analysis

DOE O 420.1B and the corresponding contractor's requirements document require the development of a fire hazard analysis for select facilities under certain circumstances. Examples of facilities for which an FHA should be performed are nuclear and high-hazard facilities (as defined by DOE), buildings in which significant quantities of hazardous materials are stored or processed, and structures featuring equipment of considerable value. These examples encompass new facilities as well as significant renovations to existing facilities. Examples of facilities not generally requiring an FHA include small utility buildings, trailers, and office buildings.

The purpose of an FHA is to comprehensively and qualitatively assess the risk from fire within individual fire areas in a DOE facility to ascertain whether the DOE fire safety objectives are met. This must include an assessment of the risk from fire and related hazards (direct flame impingement, hot gases, smoke migration, firefighting water damage, etc.) in relation to existing or proposed fire safety features to ensure that the facility can be safely controlled and stabilized during and after a fire. To the extent that this analysis completely addresses the preceding issues, an FHA will satisfy the requirements for a traditional Fire Protection Safe Shutdown Analysis. In accordance with the "graded approach" concept, the level of detail necessary for an acceptable FHA is directly related to the complexity of the facility and the potential risk to the public and facility operators. The scope and content of an FHA should be limited to only those issues that are relevant to the facility. To facilitate the development of graded fire hazards analyses, model FHAs have been developed. These models can be found in the *DOE Fire Protection Resource Manual (Handbook).*

Graded Approach

The graded approach is defined in 10 CFR 830.3, "Definitions," as the process of ensuring that the level of analysis, documentation, and actions used to comply with a requirement is commensurate with the following seven attributes:

1. The relative importance to safety, safeguards, and security
2. The magnitude of any hazard involved
3. The life-cycle stage of a facility
4. The programmatic mission of a facility

5. The particular characteristics of a facility
6. The relative importance of radiological and nonradiological hazards
7. Any other relevant factor

The listed attributes determine the depth of analysis of a DSA. DOE-STD-3009-94 specifies only three of the above seven attributes (attributes 2, 3, and 5) for the graded approach but also provides some guidance for the application of attribute 6. The rule, Orders, or standards referenced in this procedure provide no other specific guidance regarding the application of attributes 1, 4, or 7.

Limiting Conditions for Operation

Limiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility.

Limiting Control Setting

Limiting control settings are settings for automatic alarm or protective devices related to those variables having significant safety functions. Where a limiting control setting is specified for a variable on which a safety limit has been placed, the setting must be so chosen that protective action, either automatic or manual, will correct the abnormal situation before a safety limit is exceeded.

Operational Readiness Review

As defined in DOE-STD-3006-2000, an operational readiness review is "a disciplined, systematic, documented, performance-based examination of facilities, equipment, personnel, procedures, and management control systems to ensure that a facility will be operated safely within its approved safety envelope as defined by the facility safety basis."

DOE must conduct an ORR when any of the following conditions occur:

- Initial startup of a new hazard category 1, 2, or 3 nuclear facility.
- Restart after a DOE management official directs the unplanned shutdown of a nuclear facility for safety or other appropriate reasons.
- Restart after an extended shutdown for hazard categories 1 and 2 nuclear facilities. (Extended shutdown for a hazard category 1 nuclear facility is 6 months. Extended shutdown for a hazard category 2 nuclear facility is 12 months.)
- Restart of hazard categories 1 and 2 nuclear facilities after substantial process, system, or facility modifications. The restart authority must determine if the modifications are substantial based on the impact of the changes on the safety basis and the extent and complexity of changes.
- Restart after a nuclear facility shutdown because of operations outside the safety basis.
- When deemed appropriate by DOE management officials, including restarts of hazard category 3 nuclear facilities.

Preliminary Documented Safety Analysis

The PDSA for new facilities serves as the principal safety basis for the DOE decision to authorize design, procurement, construction, and pre-operational testing. The safety analysis should be initiated and technical interchanges conducted with DOE at the earliest practical point in the conceptual or the preliminary design so that the required functional attributes of

safety SSCs can be specified in the detailed design. These early interchanges are intended to support development of a consensus on the safety issues between the various design and safety organizations involved in the project. The PDSA will identify preliminary commitments to the facility's ultimate design and operation.

Potential Inadequacies of the Safety Analysis

As stated in DOE G 424.1-1, in general, a PISA "arises from the following entry conditions:

- a discrepant as-found condition,
- an operational event or incident, or
- new information, including discovery of an error, sometimes from an external source."

When a PISA is suspected, based on a discrepancy or as-found condition, the usual USQ process may be used in a backward-looking manner. That is, the as-found condition can be viewed as a proposed activity. Other PISAs may result from an operational event or incident or from new information, including discovery of an error. The USQ process is often modified to add a question that asks if the issue is a PISA to ensure that all potential inadequacies are properly identified. Once declared, a PISA must be the subject of an unreviewed safety question determination, and it cannot be screened out of the process. If a PISA or a possible reduction in the safety margins defined in the TSR bases is identified, the safety basis may no longer be bounding, or it may be inadequate in other ways. In this case, the contractor must perform the following:

- Notify DOE.
- Place the facility in a safe and stable condition until the safety evaluation is completed.
- Conduct a USQD (within a few days, not weeks or months).
- Submit a completed safety evaluation to DOE before removing any operational restrictions.

Readiness Assessment

As defined in DOE-STD-3006-2000, a readiness assessment (RA) is defined as "a review that is conducted to determine a facility's readiness to startup or restart when an Operational Readiness Review is not required or when contractor's standard procedures for startup are not judged by the contractor or DOE management to provide an adequate verification of readiness."

For restarts of nuclear facilities not requiring an ORR, DOE line management must evaluate the need for performing an RA prior to restart. This includes the startup or restart of program work associated with operating facilities when the new or restarted program work does not require DOE approval of changes to facility limits or requirements as stated in OSRs/TSRs, BIOs/SARs, or other equivalent authorization basis documents. When an RA is required, site offices must develop procedures and ensure that the contractors use these procedures to gain site office approval of the startup or restart of nuclear facilities. If an RA is not to be performed, the contractor's standard operating procedures for startup or restart will be used.

Safety Significant Components (SSCs)

Note: SSCs are "structures, systems, and components. This item is addressed based on this definition. Safety-significant SSC are covered in a later item.

"Structures, systems, and components" is a general term encompassing all of the elements of a facility or activity that contribute to protection and safety. Structures are the passive elements: buildings, vessels, shielding, etc. A system comprises several components, assembled in such a way as to perform a specific function.

Safe Harbor Methodologies

The safe harbor methodologies are methods identified in standards developed by DOE or the Nuclear Regulatory Commission, or defined in regulations promulgated by the Occupational Safety and Health Administration. These standards are based on many years of experience with the types of facilities and activities to which they may be applied. Contractors do not need to get prior DOE approval to use the safe harbor methods in accordance with the stated provisions in 10 CFR 830. Contractors will need DOE approval to use a method other than the safe harbor methods.

Safety Analysis Report for Packaging

A SARP is a document that provides a comprehensive technical evaluation of a package. The SARP consists of sections on general information; structural, thermal, containment, shielding, and criticality evaluations; operating procedures; acceptance tests; and maintenance and quality assurance programs. The purpose of the SARP is to demonstrate compliance with the applicable sections of 10 CFR 71 and 49 CFR 100-185.

Safety Basis

The safety basis is the DSA and hazard controls that provide reasonable assurance that a DOE nuclear facility can be operated safely in a manner that adequately protects workers, the public, and the environment.

Safety Class SSCs

"Safety class SSC" is a designation applied to SSCs whose failure could adversely affect the environment or safety and health of the public, as identified by safety analyses.

Safety Evaluation Report

The safety evaluation report is a management document that provides the approval authority, the basis for the extent and detail of the DSA review, and the basis for any conditions of DSA approval.

Safety Limit

Safety limits are those bounds within which process variables must be maintained for adequate control of the operation and that must not be exceeded in order to protect the integrity of the physical system that is designed to guard against uncontrolled release or radioactivity. If any safety limit is exceeded, corrective action must be taken as stated in the technical specification or the affected part of the process, or the entire process if required, must be shut down, unless this action would further reduce the margin of safety.

Safety Significant SSCs

Safety significant SSCs are structures, systems, and components not designated as safety class SSCs, but whose preventive or mitigative function is a major contributor to defense-in-depth and/or worker safety, as determined from hazard analysis.

"Safety significant SSC" designations based on worker safety are limited to those systems, structures, or components whose failure is estimated to result in irreversible consequences to workers. Irreversible consequences are defined to be prompt fatality, serious injuries, or significant radiological or chemical exposures. Serious injuries, as used in this definition, refer to immediately life-threatening or permanently disabling injuries. Significant potential effects of exposure or uptake of radiologically or chemically hazardous materials should be considered for identification of safety-significant SSCs using qualitative estimates of the consequences.

Shipper Receiver Agreements

The site/facility operator must develop and implement a program to control and account for both internal and external transfers of nuclear materials for each facility. This program must include documented procedures that specify requirements for authorization, documentation, tracking, verification, and response to abnormal situations that may occur during transfer of nuclear materials. Use of confirmatory measurements in lieu of verification/accountability measurements for such items requires a shipper/receiver agreement approved by both the shipper's and receiver's DOE cognizant security authority.

Specific Administrative Controls

SACs are administrative controls that are selected to provide preventive and/or mitigative functions for specific potential accident scenarios, and that also have safety importance equivalent to engineered controls that would be classified as safety class or safety significant if the engineered controls were available and selected.

Similar to the classification of structures, systems, and components as safety SSCs, not all ACs requiring specific actions related to individual accident scenarios rise to the level of importance of SACs. Similar to SSCs of lower importance, which are sometimes referred to as "important to safety" or "defense-in-depth" SSCs, SACs of lesser importance can be addressed under the implementation of related safety management programs.

An SAC exists when an AC (1) is identified in the DSA as a control needed to prevent or mitigate an accident scenario, and (2) has a safety function that would be SS or SC if the function were provided by an SSC.

Startup Notification Report

A startup notification report is a periodic report by each responsible contractor to identify future nuclear facility new starts and restarts, usually those scheduled in the next year. The report identifies the facility and specifies whether an ORR or an RA is required.

Surveillance Requirements

Surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met.

Technical Safety Requirements

TSRs define the performance requirements of SSCs and identify the safety management programs used by personnel to ensure safety. TSRs are aimed at confirming the ability of the

SSCs and personnel to perform their intended safety functions under normal, abnormal, and accident conditions. These requirements are identified through hazard analysis of the activities to be performed and identification of the potential sources of safety issues. Safety analyses to identify and analyze a set of bounding accidents that take into account all potential causes of releases of radioactivity also contribute to development of TSRs.

Design Basis

The design basis is information that identifies the specific functions to be performed by a structure, system, or component of a facility and the specific values or range of values chosen for controlling parameters as reference bounds of design. These values may be restraints derived from generally accepted state-of-the-art practices for achieving functional goals, or requirements derived from analyses (based on calculations and/or experiments) of the effects of a postulated accident for which a structure, system, or component must meet its functional goals.

USQ Process

The USQ process allows contractors to make physical and procedural changes and to conduct tests and experiments without prior DOE approval if the proposed change can be accommodated within the existing safety basis.

References: DOE O 420.1B
DOE G 450.4-1B
DOE-STD-3009-94
10 CFR 71
10 CFR 830.3
49 CFR 100–185

e. Describe how the TSR is derived, how it is used, and what constitutes a violation.

TSRs define the performance requirements of SSCs and identify the safety management programs personnel use to ensure safety. TSRs are aimed at confirming the ability of the SSCs and personnel to perform their intended safety functions under normal, abnormal, and accident conditions. These requirements are identified through hazard analysis and through the identification of the potential sources of safety issues. Also contributing to the development of TSRs are safety analyses to identify and analyze a set of bounding accidents that take into account all potential causes of releases of radioactivity. Through the analyses of the encompassing bounding accidents, the necessary safety systems and accident mitigating systems are identified and their characteristics are defined. Flowing from the analyses is information that provides the bases for controls, limits, and conditions for operation, known as TSRs. TSRs explicitly show this relationship. The content of the DSA must remain valid so that the safety basis of the facility, as implemented in operations through the TSR, remains valid.

Safety basis violations can only result from a gross safety management program failure, significant enough to render the DSA assumptions invalid. Any of the following constitutes a TSR violation:

- Failure to establish, implement, or maintain a TSR administrative control program
- Failure to establish, implement, or maintain a TSR AC procedure

- Systematic failure to comply with TSR AC programs or procedures
- A procedure containing the following components should be established, implemented, and maintained for reporting TSR violations:
- Placing the facility in the waste storage/disposal mode
- Reporting the violation in accordance with the required reporting procedure
- Preparing a recovery plan describing steps that will reinstate compliance with the TSR
- Performing and documenting a technical evaluation, if appropriate, of the TSR violation to determine if a USQ exists

References: 10 CFR 830, subpart B
DOE G 423.1-1
DOE-STD-1186-2004

f. Discuss the hazard categorization levels, chemical hazard classification levels, and the process utilized to determine the facility hazard category or classification.

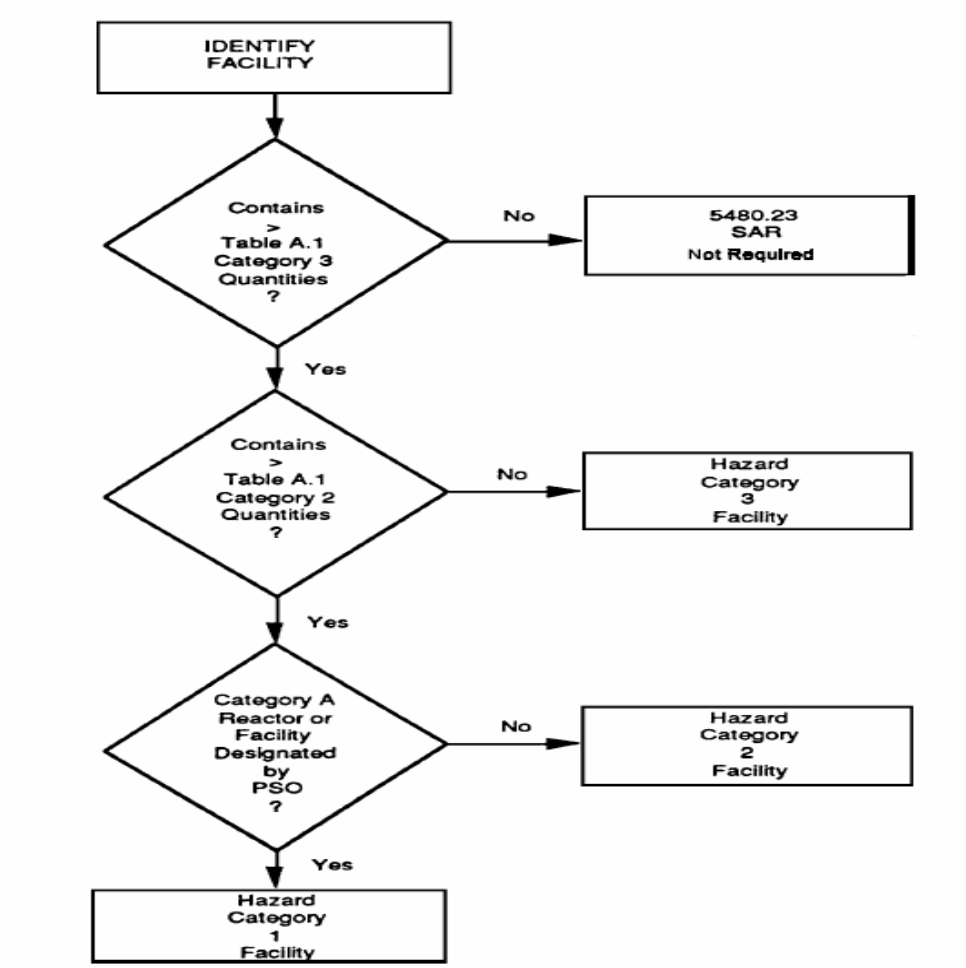
Hazard Categorization Levels

Category level 1 hazards have the potential for significant off site consequences, based on total curie content, potential material forms, and maximum energy for dispersion available. One class of facilities that possess this hazard potential is the class A nuclear reactors. Category level 2 facilities have the potential for significant on site consequences. Category level 3 is designed to capture facilities that largely include laboratory operations, low-level waste-handling facilities, and research machines that possess less than the category 2 quantities of material and are considered to represent a low hazard. Facilities should be classified as category level 3 if there is only the potential for significant localized consequences. Essentially all industrial facilities have a potential for significant localized consequences because the potential to injure workers from typical industrial accidents is always present. However, category 3 facilities pose additional hazards due to the presence of radionuclides.

Contractors are required to perform a hazard analysis of their nuclear activities and classify their processes, operations, or activities in accordance with the following requirements:

- The hazard analysis should be based on an inventory enveloping all radioactive and nonradioactive hazardous materials that are stored, utilized, or may be formed within a nuclear facility.
- The hazard analysis should identify energy sources or processes that might contribute to the generation or uncontrolled release of hazardous materials. The hazard analysis should estimate the consequences of accidents in which the facility or process and/or materials in the inventory are assumed to interact, react, or be released in a manner to produce a threat or challenge to the health and safety of individuals on site and off site.
- The hazard analysis should be submitted to DOE for approval in accordance with the safety analysis plan.

The following figure depicts the process by which a nuclear facility hazard category is determined.



Source: DOE-STD-1063-2006, figure 3.1

Hazard classification decision process

Chemical Hazard Classification Levels

Chemical hazard classes are established by the Occupational Safety and Health Administration and the Environmental Protection Agency. The categorization process utilized involves a direct analysis of the chemical in question, with regard to its Chemical Abstract Service number, and its related toxicity, reactivity and corrosivity.

Regulated toxic and flammable substances and their threshold quantities are listed in 40 CFR 68.130. Extremely hazardous substances and threshold planning quantities are listed in 40 CFR 355, appendixes A and B. Process safety management chemicals are listed as part of Appendix A to 29 CFR 1910.119, which identifies highly hazardous chemicals, toxics, and reactives.

References: DOE-STD-1063-2006
29 CFR 1910.119
40 CFR 68.130
40 CFR 355, appendixes A and B

g. Discuss the reasons for performing a USQ determination.

USQs are brought to the attention of DOE for review and approval before changes are made. A proposed change or test involves a USQ if

- the probability or consequences of an accident or malfunction of equipment important to safety could be increased,
- the possibility of a different type of accident than previously evaluated in the DSA could be introduced, or
- margins of safety could be reduced.

References: 10 CFR 830.203

h. Discuss the responsibilities of DOE and contractors authorized to operate nuclear facilities for the performance of USQ determinations.

Each facility should identify the methods by which facility changes can be made. After these methods have been identified, each facility must determine what constitutes an acceptable means to make a change; that is, the contractor must clearly control the facility change process and must perform and document changes in accordance with approved procedures. Performing a modification under the guise of maintenance is not acceptable because the proper control processes to analyze the proposed change and document its outcome could be insufficient. It is necessary to identify all means for performing a change because each one provides a direct input into the USQ process and must be integrated accordingly.

The USQ process is intended to be implemented along with a change control process that includes generalized steps for identifying and describing the temporary or permanent change, technical reviews of the change, management review and approval of the change, implementation of the change, and documenting the change. As part of the technical reviews of a change, the contractor should perform the appropriate type of safety analysis to ascertain whether the change is indeed safe. This is accomplished separately from the USQ process. The USQ process is used subsequently to determine if final approval of the change by the contractor is sufficient or if DOE approval must be obtained.

DOE's responsibilities are to

- periodically review USQ screens and USQDs to ensure the process is working properly, and
- approve changes when DOE approval is required and warranted.

References: 10 CFR 830.203

i. Discuss the actions to be taken by a contractor and DOE upon identifying information that indicates a potential inadequacy of the safety analysis.

Written USQ determinations are required when a contractor identifies a potential inadequacy of the safety analyses that support the DOE-approved safety basis, which indicates the safety analysis is not bounding or may be otherwise inadequate.

References: DOE G 424.1-1A

j. Discuss the actions to be taken by a contractor and DOE if it is determined that a PISA exists.

Because an inadequacy in the safety analyses has the potential to call into question information relied on for authorization of operations, DOE requires the contractor to

- take appropriate action to place or maintain the facility in a safe condition,
- expeditiously notify DOE when the information is discovered,
- perform a USQ determination and submit the results promptly, and
- complete an evaluation of the safety of the situation and submit it to DOE before removing any operational restrictions implemented to compensate for the analytical discrepancy.

References: DOE G 424.1-1A

k. Describe the safety basis documents for the facilities in the STSM's organization and how they are prepared, reviewed, approved, and updated:

- **The safety basis documents for the facilities under the purview of the STSM's organization;**
- **The scope of operations, hazards, postulated accidents, and controls/ requirements for the assigned facilities as documented in the safety basis documents;**
- **The safety basis documentation preparation, revision, and update processes and the associated responsibilities of the contractor and DOE;**
- **The review and approval processes for safety basis documents and the associated responsibilities of the contractor and DOE;**
- **The level of approval authority as it relates to facility hazard categorization and classification and safety basis documents;**
- **The steps in the preparation, review, and approval of a safety evaluation report.**
- **The process for flow down of controls and requirements and the derived operating procedures, processes, and programs; and**
- **Identify the conditions and procedures used to maintain and modify safety documents.**

Note: This is a facility-based element. The Qualifying Official at the facility will evaluate its completion.

l. Discuss the purpose, content, and philosophy, as appropriate to the position, of the following safety management standards for nuclear explosive safety:

- **DOE O 452.1B, Nuclear Explosive and Weapons Surety Program;**
- **DOE O 452.2B, Safety of Nuclear Explosive Operations;**
- **DOE O 461.1A, Packaging and Transfer or Transportation of Materials of National Security Interest;**
- **DOE O 5610.13, Joint Department of Energy/Department of Defense Nuclear Weapon System Safety, Security, and Control Activities; and**
- **DOE O 5660.1B, Management of Nuclear Materials**

DOE O 452.1B, Nuclear Explosive and Weapons Surety Program

Purpose

The purpose of DOE O 452.1B is to prevent accidents and inadvertent or unauthorized use of U.S. nuclear explosives (including nuclear weapons). The DOE Nuclear Explosive and

Weapon Surety (NEWS) Program is established for this and subsequent objectives and implemented through the following Orders:

- DOE O 452.2B, *Safety of Nuclear Explosive Operations*
- DOE O 452.4A, *Security and Control of Nuclear Explosives and Nuclear Weapons*
- DOE Order 5610.13, *Joint Department of Energy/Department of Defense Nuclear Weapon System Safety, Security, and Control Activities*

Additionally, its purpose is

- in conjunction with the Department of Defense (DoD), to protect the public health and safety by providing dual-agency judgment and responsibility for the safety, security, and control (surety) of nuclear weapons;
- to establish nuclear explosive surety standards, nuclear weapon design surety requirements, and NEWS assessment requirements;
- to address surety vulnerabilities during all phases of the nuclear weapon life cycle, and to upgrade surety during weapon stockpile refurbishments and/or new weapon development; and
- to establish requirements and responsibilities for planned nuclear explosive operations.

[Note: DOE O 452.1B was canceled and superseded by DOE O 452.1C.]

DOE O 452.2B, Safety of Nuclear Explosive Operations

Purpose

The purpose of DOE O 452.2B is to establish specific nuclear explosive safety program requirements to implement the DOE NES standards and other NES criteria for routine and planned NEOs.

Contents

The contents of this Order include DOE Nuclear Explosive Safety Standards. All NEOs must meet qualitative NES standards to prevent unintended nuclear detonation or fissile material dispersal from the pit. It also includes the establishment of a Nuclear Explosive Safety Program, under which NEOs require special consideration because of the potentially high consequences of an accident or unauthorized act. Site offices and the Office of Secure Transportation must ensure implementation of a formal, comprehensive NES program.

[Note: DOE O 452.2B was canceled and superseded by DOE O 452.2C.]

DOE O 461.1A, Packaging and Transfer or Transportation of Materials of National Security Interest

Purpose

The purpose of DOE O 461.1A is to establish requirements and responsibilities for offsite shipments of naval nuclear fuel elements, category I and II special nuclear material, nuclear explosives, nuclear components, special assemblies, and other materials of national security interest; onsite transfers of naval nuclear fuel elements, category I and II SNM, nuclear components, special assemblies, and other materials of national security interest; and certification of packages for category I and II SNM, nuclear components, and other materials of national security interest.

Contents

The contents of this Order include requirements relating to packaging and transportation procedures, offsite packaging and transport, onsite packaging and transfer, scheduling transportation safeguards systems shipments, training, and packaging, transfer and transportation plans. The requirements also apply to safeguards and security, documents/records, and exemptions.

DOE Order 5610.13, Joint Department of Energy/Department of Defense Nuclear Weapon System Safety, Security, and Control Activities

Purpose

The purpose of DOE Order 5610.13 and its successor, DOE O 452.6, is to establish DOE and NNSA requirements and responsibilities for addressing joint nuclear weapon and nuclear weapon system surety activities in conjunction with DoD; to establish and implement a systematic process to ensure that nuclear weapon surety is adequately addressed throughout all phases of each nuclear weapon's life cycle; and to provide support to DoD during the development, staffing, and implementation of safety rules that govern all nuclear weapon system operations throughout the stockpile-to-target sequence.

Contents

NNSA, in conjunction with DoD, has an obligation to protect public health, safety, and the environment from potential adverse consequences of nuclear weapon operations. To ensure dual-agency judgment and responsibility, nuclear weapon system safety, security, and use control (surety) will be evaluated continually throughout the entirety of each nuclear weapon system's life cycle. Nuclear weapon system surety will include a combination of administrative controls (e.g., personnel security) and design measures (e.g., physical security, use control) sufficient to prevent deliberate, unauthorized nuclear detonation and to minimize the possibility of deliberate, unauthorized acts that could lead to nuclear detonation. Nuclear weapon system safety will include design features, safety rules, procedures, accident prevention/mitigation measures, or other controls used collectively or individually to reduce the likelihood, severity, or consequences of an accident.

[Note: DOE O 5610.13 was canceled and archived, and replaced by DOE O 452.6, *Nuclear Weapon Surety Interface with the Department of Defense.*]

DOE Order 5660.1B, Management of Nuclear Materials

Purpose

The purpose of DOE Order 5660.1B is to establish requirements and procedures for the management of nuclear materials within the DOE to reach the following objectives: conserve valuable nuclear material resources; distribute nuclear materials needed for DOE and other programs for research, development, and other purposes; optimize nuclear materials production, processing, and inventory management operations; and conduct studies and prepare plans for the future use and disposition of nuclear materials, including operation of DOE nuclear materials production, processing, and storage facilities.

Contents
The contents include a list of responsibilities and authorities, a list of definitions, and the requirements regarding the following issues related to nuclear materials management:

- Forecasting nuclear material requirements
- Material management plans
- Analytical studies
- Nuclear material allotments
- Nuclear material inventory management
- Inactive materials
- Material management reviews and appraisals

Additional information on all these Orders is available at http://www.directives.doe.gov.

Mandatory Performance Activities:

a. Review and evaluate a USQ Determination, including walking down the proposed change/potential inadequacy.

b. Review and evaluate an Authorization Agreement.

c. Review and evaluate a Safety Evaluation Report.

d. Walk down a facility with a Safety System Oversight person, safety analyst or SME identifying the safety controls contained in a TSR.

e. Complete a review of a hazard analysis or accident analysis, including walking down the scope of work area or accident scenario.

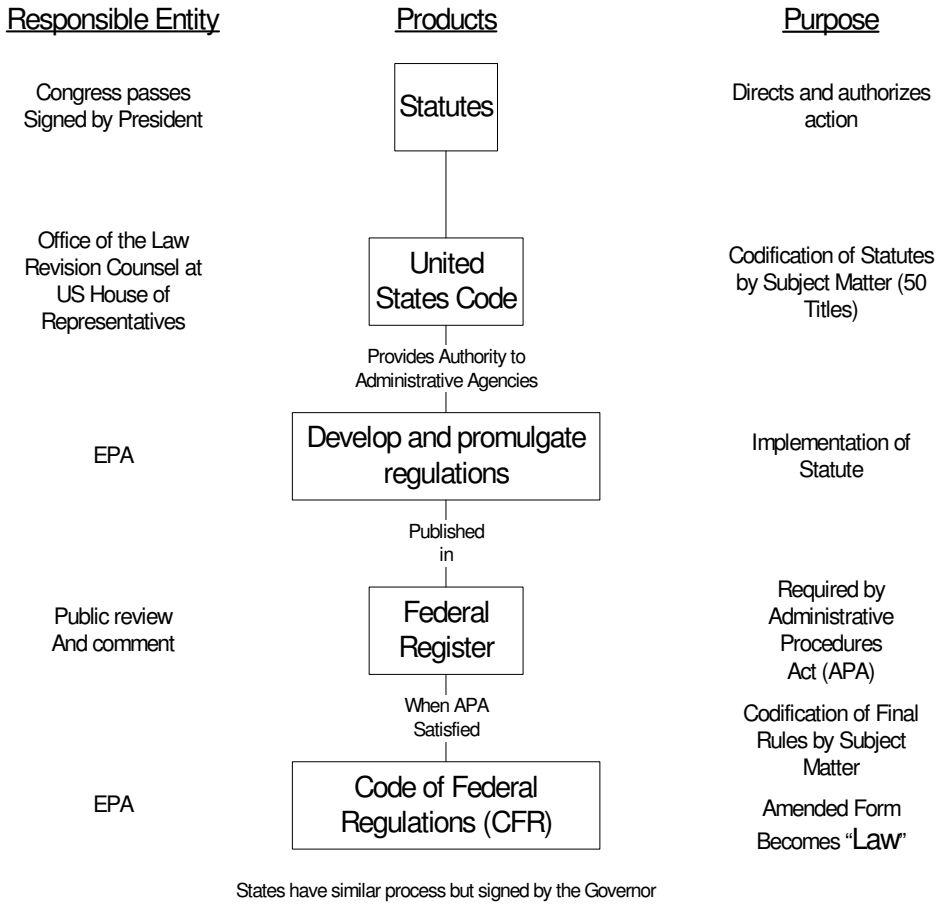
Note: The mandatory performance activities a through e are performance based. The Qualifying Official will evaluate the completion of these activities.

7. An STSM shall have a working level knowledge of the application of environmental standards, laws, and regulations.

a. Demonstrate awareness of sources of environmental rules, such as Federal and state statutes, regulations, and DOE orders.

Environmental law consists of a system using all of the laws in the U.S. legal system to minimize, prevent, punish, or remedy actions that damage or threaten to damage the public health and safety or the environment. Statutes or Executive orders empower an administrative agency to develop and promulgate regulations. Statutes direct and authorize, while regulations detail implementation. When a statute is passed through both Houses of Congress and is signed into law by the President, it becomes the authorization and guidance to a regulating agency to establish a regulation, and is published in the *United States Code*. The regulating agency formulates and promulgates the proposed regulation by publishing it in the *Federal Register* to allow for public review and comment. When finalized, the regulation is again published in the *Federal Register* in its amended form to become law. These final regulations are combined annually into the *Code of Federal Regulations*. State laws and regulations are passed in the same manner as Federal laws, except they require the

signature of the state's governor to become law. With respect to environmental laws, the states can enact laws and regulations more stringent than their Federal counterparts, but no less stringent or they are prone to preemption. This process example is shown in the following figure.



Source: Original

The purpose of DOE O 450.1 is to implement sound stewardship practices that are protective of the air, water, land, and other natural and cultural resources impacted by DOE operations, and by which DOE cost-effectively meets or exceeds compliance with applicable environmental, public health, and resource protection laws, regulations, and DOE requirements.

b. Describe the organization, mission, and enforcement authorities of the Environmental Protection Agency (EPA).

EPA Organization

EPA is directed by an administrator and a deputy administrator who are appointed by the President and subject to the approval of the Senate. The President also appoints EPA's inspector general, general counsel, and nine assistant administrators, each subject to Senate confirmation. The nine assistant administrators are charged with management of specific programs. Additionally, three associate administrators are appointed by the administrator and tasked with the execution of programs for public affairs, congressional and legislative

relations, and regional, state, and local relations. Ten regional administrators have the task of interfacing with state and local governments to achieve the agency's mission.

EPA Mission

The mission of the EPA is the protection of human health and the environment.

EPA Enforcement Authorities

EPA is organized into offices for the enforcement of environmental regulations and the management of agency functions as follows:

- The Office of Water administers the Safe Drinking Water Act, the Clean Water Act, and the Ocean Dumping Ban Act of 1988.
- The Office of Air and Radiation enforces the Clean Air Act, sets the National Ambient Air Quality Standards, and establishes criteria, standards, and policies to control radiation and indoor air pollution exposures.
- The Office of Solid Waste and Emergency Response administers the provisions of the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the Emergency Planning and Community Right-to-Know Act.
- The Office of Pollution Prevention, Pesticides and Toxic Substances enforces the provisions of the Federal Insecticide, Fungicide, and Rodenticide Act, and the Toxic Substances Control Act, and establishes tolerances for pesticide residues in foods under the Federal Food, Drug, and Cosmetics Act.
- The Office of Enforcement and Compliance Assurance enforces environmental laws by investigating and preparing cases for judicial action, as necessary. This office administers the National Environmental Policy Act and other regulations pertaining to Federal agencies.

References: U.S. Code, Congressional and Administrative News, 91st Congress 2nd session, vol. 3, 1970
http://www.epa.gov

c. Discuss the National Environmental Policy Act process and the role of the Department and its contractors in implementation.

In general, the process for implementing NEPA begins with a proposed action generated (usually) by a contractor, who approaches the site or facility NEPA officer for review. If an exclusion exists allowing the action to proceed, this determination is presented to the site manager for final written signature and approval. In the event no exclusion exists, an initial environmental assessment is performed by the contractor and again presented to the NEPA officer. If the implications of the action, as defined by the assessment, suggest considerable environmental impact, a full environmental impact study is commissioned, the results of which are then presented to the Headquarters NEPA Office and general counsel for final determination. Although contractors may assist in the Department's NEPA implementation, the legal obligation to comply with NEPA belongs to DOE.

The NEPA process is slightly different for each DOE site, but in general has the same basic elements, including a contractor-produced proposed action statement and environmental checklist, which is turned in to the site NCO for review. If no categorical exclusion exists as

listed in 10 CFR 1021, and the project does not fall under currently approved NEPA functions at the site, an environmental assessment is ordered. Once the assessment is completed, the NCO determines either there is a finding of no significant impact or a full environmental impact statement is required. Once this statement is successfully completed and submitted, the work may begin with or without restriction(s) placed on it by the NCO.

References: DOE O 450.1B

d. Describe the role(s) of a DOE contractor with respect to compliance with environmental laws and regulations, and discuss the responsibilities of the Federal staff employees for management and oversight of the DOE contractor for such compliance.

The role of a DOE contractor in complying with environmental laws and regulations begins with the contractor accepting full responsibility for that compliance as a matter of contractual obligation. The CRD indicates and mandates that contractors perform their duties under full compliance with all applicable laws and regulations, environmental and otherwise.

The Federal staff responsibilities are to

- issue and update, as required, a general environmental statement that reflects the statement of policy and contains broad environmental protection goals for all facilities and activities for which they are responsible;
- ensure that all operations under their authority comply with applicable environmental protection laws and regulations, and directives;
- identify significant environmental compliance issues that require resolution and coordination, and advise EH-1 and HQ program elements in a timely manner;
- ensure that all required environmental permits are secured from the appropriate regulatory agency in a timely fashion;
- conduct environmental appraisals of programs, projects, and facilities according to ES&H requirements, and provide copies of appraisal reports to EH-1 and the appropriate program office;
- establish and maintain liaison and cooperative programs with appropriate Federal, regional, state, and local environmental officials to facilitate effective environmental management;
- develop and implement programs that direct contractors to execute environmental protection compliance programs and policies, and provide for oversight, confirmation, and independent verification of those contractor programs;
- prepare long-range environmental protection plans according to guidance issued by EH-1;
- ensure that budget requests provide for required environmental protection upgrades and corrective action, that they are timely, and that they are consistent with pollution abatement plans prepared as required by OMB Circular A-106;
- prepare biannual pollution abatement plans required by OMB Circular A-106 and submit them to EH-1 on a schedule provided by that office;
- provide EH-1 all environmental information and documentation that are requested;
- curtail or suspend any operation that poses a clear and present danger to members of the public or the environment;

- provide for community public information and education programs concerning DOE environmental protection programs, consistent with the requirements of environmental regulations and national security interests.

References: DOE O 450.1

e. Demonstrate awareness that environmental requirements are enforceable criminally and civilly.

Under environmental statues, enforcement actions can be initiated by several sources. Certain environmental statutes can be enforced, with limited exceptions, only through Federal action. However, in cases where larger penalties are imposed and/or that involve court action, EPA is required to seek prosecution through the Department of Justice.

In states where enforcement of regulations has been delegated, the state may undertake legislative action according to Federal guidelines. In cases where authority has been delegated to the states, the state, Federal Government, or both may exercise enforcement rights. If the statute being enforced is unique to the state, the state has the entire responsibility for enforcement. Local governments enforce local laws.

While criminal enforcement actions are primarily the province of Governments, individuals under citizen suit provisions may initiate civil actions in a variety of environmental regulations. Additionally, common lawsuits by individuals are viable as a means of recovering damages suffered for monetary loss or the loss of use of property as a result of environmental violations.

Enforcement of environmental laws is achieved through the imposition of various liabilities ranging from administrative fines through criminal prosecution. Factors such as the nature of the violation, consequence of the violation, culpability, the particular regulation or law violated, and the party initiating legal action determine the legal avenue to be pursued in redress of the violation.

Liabilities fall into three general categories: penalties, remedy requirements, and compensation requirements. Environmental penalties may be imposed while a violation exists, regardless of actual injury. Penalties can be administrative or criminal, depending on the degree of culpability or blame that is attached to the violation. Culpability is determined based on the intent of the violator and on the absence of due care.

Civil and administrative penalties make up the majority of penalties imposed and can take the form of monetary fines ranging from $5 to $25,000 per day per violation. Civil penalties are a result of actions filed in civil courts, while administrative penalties are levied by the regulating agency. In cases where the violator appeals an administrative action or refuses to pay the fine, the case will be referred to the civil court system.

Certain environmental statutes exercise two classes of administrative penalties. Class I penalties are imposed with a minimum of formality and no hearing of record. Class II penalties may cost $25,000 per day per violation and require an on-the-record hearing. Civil and administrative penalties may be negotiated with the regulating agency prior to judicial

decision. They may be contained in compliance agreements and imposed as part of a judicial decree.

Criminal penalties for environmental violations are incurred for the commission of a prohibited act or the omission of a required act under an environmental regulation in conjunction with an element of culpability. Criminal penalties can result in imprisonment, in addition to monetary fines, and can be directed against individuals in an organization as well as the organization. Criminal charges are sought for knowing violations, negligent violations, violation of notice requirements, and issuing false statements and endangerment.

The second category of liability is the requirement to respond to the results of an environmental violation. Two primary statutes require response actions - CERCLA and RCRA.

The third category of liability is the requirement to compensate for the harm caused by the violation. Compensation is in addition to any fines levied and is usually the result of a toxic tort suit or an action to recover natural resource damages.

References: 42 U.S.C. 6901
42 U.S.C. 7401
33 U.S.C. 1251-1387
42 U.S.C. 9601
P.L. 102-386

f. Discuss ISO 14001, Environmental Management Systems Standards, and their relevance to DOE and contractor performance.

ISO 14001:2004 specifies requirements for an EMS to enable an organization to develop and implement a policy and to identify objectives that take into account legal requirements and other requirements to which the organization subscribes, and to gather information about significant environmental aspects. It applies to those environmental aspects that the organization identifies as those which it can control and those which it can influence. It does not itself state specific environmental performance criteria.

ISO 14001:2004 is applicable to any organization that wishes to establish, implement, maintain and improve an EMS, to assure itself of conformity with its stated environmental policy, and to demonstrate conformity with ISO 14001:2004 by making a self-determination and self-declaration, or

- seeking confirmation of its conformance by parties having an interest in the organization, such as customers, or
- seeking confirmation of its self-declaration by a party external to the organization, or
- seeking certification/registration of its EMS by an external organization.\

All the requirements in ISO 14001:2004 are intended to be incorporated into any environmental management system. The extent of the application will depend on factors such as the environmental policy of the organization, the nature of its activities, products and services, and the location where and the conditions in which it functions.

ISO 14001:2004 also provides, in annex A, informative guidance on its use.

The intent of an ISO 14001 EMS is to develop a systematic management approach to the environmental concerns of the organization. The expected outcome of this approach is continual improvement in environmental management.

By setting an environmental policy, then making the environmental concerns of the firm clear (aspects) and defining what will be done to control them (objectives and targets), planning is accomplished. Then, by establishing organizational structure, personnel responsibilities, competency and training, implementation begins. Communication practices, documentation control and procedural documents, operational control and emergency preparedness define the operation portion of the program. These items are usually included in an EMS manual, which documents a program to accomplish the objectives and targets set above. The organization's methods for measuring and monitoring its environmental impacts is also included in the manual, along with practices for identifying nonconformance and for implementing corrective and preventive actions. These, along with routine systems audits and record keeping constitute the EMS checking and corrective action program. And finally, the program has a routine management review of its activities.

g. Discuss DOE O 450.1 and the requirements for DOE sites to implement Environmental Management Systems as part of the Integrated Safety Management System (ISMS), including goals for pollution prevention and sustainable environmental stewardship.

The purpose of DOE O 450.1 is to implement sound stewardship practices that are protective of the air, water, land, and other natural and cultural resources impacted by DOE operations, and by which DOE cost-effectively meets or exceeds compliance with applicable environmental, public health, and resource protection laws, regulations, and DOE requirements.

This objective must be accomplished by implementing EMSs at DOE sites. An EMS is a continuing cycle of planning, implementing, evaluating, and improving processes and actions undertaken to achieve environmental goals. EMSs must be part of integrated safety management systems.

All DOE elements must ensure that site ISMSs include an EMS that does the following:

- Provide for the systematic planning, integrated execution, and evaluation of programs for
  - public health and environmental protection,
  - pollution prevention (P2), and
  - compliance with applicable environmental protection requirements.
- Includes policies, procedures, and training to identify activities with significant environmental impacts, to manage, control, and mitigate the impacts of these activities, and to assess performance and implement corrective actions where needed.
- Includes measurable environmental goals, objectives, and targets that are reviewed annually and updated when appropriate.

As part of integrating EMSs into site ISMSs, DOE elements must

- Consider the following for inclusion as applicable:
  - conformity of DOE-proposed actions with state implementation plans to attain and maintain national ambient air quality standards;
  - implementation of a watershed approach for surface water protection;

- implementation of a site-wide approach for groundwater protection;
- protection of other natural resources, including biota;
- protection of site resources from wildland and operational fires;
- protection of cultural resources.

- Promote the long-term stewardship of a site's natural and cultural resources throughout its operational, closure, and post-closure life cycle.
- Reduce or eliminate the generation of waste, the release of pollutants to the environment, and the use of class I ozone-depleting substances through source reduction, including segregation and substitution, re-use, recycling, and sustainable development, and by procuring environmentally preferable products and services, pursuant to the DOE P2 and sustainable environmental stewardship goals.
- Ensure the early identification of, and appropriate response to, potential adverse environmental impacts associated with DOE operations, including, as appropriate, preoperational characterization and assessment, and effluent and surveillance monitoring.

References: DOE G 450.1-1A

h. Describe the role(s) the contractor plays in compliance with environmental regulations.

The CRD of DOE O 450.1, *Environmental Protection Program,* requires contractors to integrate numerous environmentally related requirements already placed on it by existing statutes, regulations, and policies through the use of an EMS incorporated into an ISMS. EMS requirements must be addressed in the contractor's ISMS that must be submitted for DOE review and approval under 48 CFR 970.5223-1, "Integration of Environment, Safety, and Health into Work Planning and Execution."

Regardless of the performer of the work, contractors with this CRD incorporated into their contracts are responsible for compliance with the requirements of the CRD and for flowing-down the requirements of the CRD to subcontracts at any tier to the extent necessary to ensure the contractors' compliance with the requirements.

i. Participate on an environmental assessment team, preparing and reporting the team's results to senior Federal and contractor management.

Note: This element is performance based. The Qualifying Official will evaluate its completion.

8. An STSM shall have a working level knowledge of the application of worker protection standards and the Employee Concerns Program.

a. Demonstrate awareness of sources of occupational safety and health rules, such as Federal and state statutes, regulations, and orders (e.g., DOE O 440.1A, Worker Protection Management for DOE Federal and Contractor Employees, and 10 CFR 851, Worker Safety and Health Program).

DOE O 440.1A establishes the framework for an effective worker protection program that reduces or prevents injuries, illnesses, and accidental losses by providing DOE Federal and contractor workers with a safe and healthful workplace.

DOE elements should implement a written worker protection program that provides a place of employment free from recognized hazards that are causing or are likely to cause death or serious physical harm to their employees, and that integrates all requirements in DOE O 440.1A, program requirements contained in 29 CFR 1960, applicable functional area requirements, and other related site-specific worker protection activities.

DOE elements should comply with the following worker protection requirements:

- ACGIH, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, when ACGIH TLVs are lower (more protective) than OSHA permissible exposure limits. The TLVs for exposures to laser emissions in the ACGIH indices are excluded from this requirement.
- ANSI Z136.1, *Safe Use of Lasers.*
- ANSI Z88.2, *Practices for Respiratory Protection.*
- ANSI Z49.1, *Safety in Welding, Cutting and Allied Processes*, sections 4.3 and E4.3.
- NFPA 70, *National Electrical Code*.
- NFPA 70E, *Electrical Safety Requirements for Employee Workplaces*.

The Occupational Safety and Health Act assigns two regulatory functions: setting standards and conducting inspections to ensure that employers are providing safe and healthful workplaces. OSHA standards may require that employers adopt certain practices, means, methods, or processes reasonably necessary and appropriate to protect workers on the job. Employers must become familiar with the standards applicable to their establishments and eliminate hazards. Compliance with standards may include ensuring that employees have and use personal protective equipment when required for safety or health. Employees must comply with all rules and regulations that apply to their own actions and conduct. Even in areas where OSHA has not set forth a standard addressing a specific hazard, employers are responsible for complying with the Act's "general duty" clause. The general duty clause states that each employer "should furnish a place of employment which is free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees." Statutes or Executive orders empower an administrative agency to develop and promulgate regulations. Statutes direct and authorize, while regulations detail implementation. When a statute is passed through both Houses of Congress, and is signed into law by the President, it become the authorization and guidance to a regulating agency to establish a regulation, and is published in the *United States Code*. The regulating agency formulates and promulgates the proposed regulation by publishing it in the *Federal Register* to allow for public review and comment. When finalized, the regulation is again published in the *Federal Register* in its amended form to become law. These final regulations are combined annually into the *Code of Federal Regulations*. State laws and regulations are passed in the same manner as Federal laws, except they require the signature of the state's governor to become law. With respect to environmental laws, the states can enact laws and regulations more stringent than their Federal counterparts but no less stringent or they are prone to preemption.

Title 10 CFR 851, "Worker Safety and Health Program," implements a worker safety and health program for DOE. This program establishes the framework for a worker protection program that will reduce or prevent occupational injuries, illnesses, and accidental losses by requiring DOE contractors to provide their employees with safe and healthful workplaces. Also, the program establishes procedures for investigating whether a requirement has been

violated, for determining the nature and extent of such violation, and for imposing an appropriate remedy.

DOE P 450.4, *Safety Management System Policy*, states that safety management systems provide a formal, organized process whereby people plan, perform, assess, and improve the safe conduct of work. The safety management system is institutionalized through DOE directives and contracts to establish the Department-wide safety management objective, guiding principles, and functions. The system encompasses all levels of activities and documentation related to safety management throughout the DOE complex.

The Department is committed to conducting work efficiently and in a manner that ensures protection of workers, the public, and the environment. It is Department policy that safety management systems should be used to systematically integrate safety into management and work practices at all levels so that missions are accomplished while protecting the public, workers, and the environment. Direct involvement of workers during the development and implementation of safety management systems is essential for their success.

b. Describe how the ISM core functions and principles and the quality assurance (QA) criteria are integrated into the activity-level work planning and control processes for protection of the workers at a given facility or site.

The integration of the ISM core functions and principles found in DOE P 450.4 with the quality assurance criteria listed in DOE O 414.1C is accomplished through a graded approach to their application in the ISM system description, unique to each facility or site. The cyclical nature of the core functions, along with the influence of the quality criteria, ensures a safer work environment as activities are planned with appropriate controls in place and implemented.

The correlation between performance criterion 5 in DOE O 414.1C, which indicates that work will be performed consistent with technical standards, administrative controls, and hazard controls adopted to meet regulatory or contract requirements using approved instructions and procedures, complements the core ISM function of work scope definition in DOE P 450.4, and is evidence of this integration. The identification and implementation of proper controls to mitigate is also part of the ISM core function cycle.

c. Describe the organization, and mission and enforcement authorities of the Occupational Safety and Health Administration (OSHA) and interface with the Atomic Energy Act through MOU's and 10 CFR 851.

Organization

OSHA is headed by an Assistant Secretary of Labor for Occupational Safety and Health. The agency is organized functionally, with major programs grouped into directorates headed by members of the Senior Executive Service. Programs are carried out by regional offices and subordinate area and district offices (or, in the case of the San Francisco region, service centers).

Mission

As defined in its enabling legislation, P.L. 91-596, the Occupational Safety and Health Act of 1970, OSHA's mission is to assure, to the extent that it is possible, every working man and woman in the nation safe and healthful working conditions. This mandate involves the application of a set of tools by OSHA (e.g., standards development, enforcement, and compliance assistance) that enable employers to maintain safe and healthful workplaces.

Enforcement

Enforcement is promulgated through P.L. 91-596, dated December 29, 1970.

Interface with AEA

The U.S. Department of Labor (DOL) and DOE have sought to clarify the regulatory authority over the occupational safety and health of contractor employees at a number of DOE Government-owned or leased facilities that are not subject to the Atomic Energy Act, which provides statutory authority for DOE to regulate occupational safety and health matters relating to private sector employees at facilities subject to the AEA.

Section 4(b)(1) of the Occupational Safety and Health Act of 1970, 29 U.S.C., section 653(b)(1), precludes OSHA coverage of working conditions over which other Federal agencies have exercised statutory authority to prescribe or enforce standards for occupational safety or health. A 1992 interagency memorandum of understanding acknowledges DOE's extensive regulation of contractor health and safety through safety orders which require contractor compliance with all OSHA standards as well as additional requirements prescribed by DOE. The agreement concludes with provisions stating that the Occupational Safety and Health Act shall not apply to GOCO sites or other facilities for which DOE, pursuant to the AEA, has exercised its authority to regulate occupational safety and health.

d. Demonstrate awareness that occupational safety and health requirements are enforceable criminally and civilly.

DOE's process and regulatory authority for its enforcement program is embodied in regulation 10 CFR 820, supplemented by the Enforcement Policy (appendix A to 10 CFR 820) and guidance documents. DOE may pursue a path that includes any of the following, based on the facts and significance of a PAAA violation:

- Monitoring a contractor's corrective actions with no further action
- An enforcement letter
- A notice of violation with no civil penalty
- A notice of violation with civil penalty
- Consent order
- Compliance order
- Referral to the Department of Justice for criminal prosecution

Decisions on severity level, the type of enforcement action, and amount of any civil penalty will be dependent on safety significance, initiative by the contractor in identification and reporting, and timeliness and effectiveness of corrective actions. With these elements appropriately addressed by the contractor, the Department can waive all or part of the civil penalties and, in some cases refrain from actions entirely. The PAAA statute provides

exemption of certain DOE not-for-profit entities for any liability for civil penalties. However, DOE may impose notices of violation for these contractors.

The vast majority of cases involving potential violations of Price-Anderson nuclear safety requirements lack the requisite level of safety significance to warrant civil penalties. These matters will be evaluated by the Office of Price-Anderson Enforcement (with input from DOE field office and/or HQ Price-Anderson coordinators) and will be subject to one of the paths described in numbers 1, 2, and 3 above. The more significant issues will be subject to one of the paths described in numbers 4, 5, or 6. The director of the Office of Price-Anderson Enforcement will issue routine notices of violation for non-NNSA activities. For NNSA-related activities, the Office will identify and investigate appropriate noncompliances in cooperation with NNSA. The NNSA Administrator issues notices of violation for NNSA activities.

In response to a notice of violation under the PAAA, contractors are required to document specific actions taken and planned to prevent recurrence of similar events. Field office personnel verify completion of corrective actions before the case is closed. Information on particular enforcement proceedings is available to the public, once DOE issues a notice of violation; prior to that point, material is confidential and considered pre-decisional. In the event of a contested case and request for adjudicatory hearing, the Deputy Assistant Secretary for ES&H or Administrator, NNSA, will request the Secretary to appoint an administrative law judge to act as presiding officer for such hearing pursuant to the requirements of 10 CFR 820.26.

DOE's approach to enforcement involves innovative methods to avoid personnel-intensive inspection forces and to better motivate contractor ownership of compliance and safety. This approach is a more effective and efficient regulatory process that, in conjunction with other elements of the DOE Safety Management Program, improves safety to the public and workers for DOE activities.

e. Describe the role(s) the contractor plays in implementing occupational safety and health regulations.

It is within the CRD that requirements of proper implementation of occupational safety and health regulations be incorporated into the contractor's activities.

References: DOE O 420.1A

f. Describe the purpose, scope, and importance of the Department's Employee Concerns Program.

The purpose of the ECP is to establish a process that ensures employee concerns related to such issues as the environment, safety, health, and management of DOE programs and facilities are addressed through

- prompt identification, reporting, and resolution of employee concerns regarding DOE facilities or operations in a manner that provides the highest degree of safe operations;

- free and open expression of employee concerns that results in an independent, objective evaluation; and
- supplementation of existing processes with an independent avenue for reporting concerns.

The program applies to all DOE elements and contractors and is important because it ensures that employees can bring concerns to management without fear of retribution.

References: DOE O 442.1A

g. Describe the responsibilities of the following in implementing DOE O 442.1A, Department of Energy Employee Concerns Program:
- **Headquarters and field office managers; and**
- **Employee concerns manager**

HQ field office managers
- designate the management position or positions responsible for developing and implementing the ECP
- direct the ECP and provide adequate resources and training for effective implementation
- ensure implementation of ECPs required by contract for contractors under their jurisdiction
- use management assessment results to verify the adequacy and implementation of the ECP and improve performance

Furthermore, managers and supervisors are responsible for establishing open communications to enable employees to raise concerns and to address the concerns of employees under their supervision in a manner that protects the health and safety of employees and the public and ensures the efficient operation of DOE programs. This responsibility must be carried out in a manner that fosters the free flow of information without employees being subjected to reprisal for raising concerns.

ECP managers
- develop and submit ECP program implementation documentation to the Secretarial Officer or field element manager, as appropriate, for approval;
- implement the approved ECP and ensure concerns are processed as required by this Order;
- publicize ECP processes, employee rights and responsibilities to report concerns through these processes, and management's intolerance for reprisals against employees who have reported concerns;
- maintain an employee concerns tracking system and a secure filing system;
- decide which concerns are brought to the attention of the ECP, which concerns the ECP office should seek to resolve, which warrant referral or transfer to another office for further review, or which warrant no further action;
- assist in evaluation and resolution of employee concerns;
- transfer concerns to other programs or processes if the concern is deemed to be outside the scope of the ECP; review and evaluate responses from other organizations to which concerns were referred, request further action when necessary, and provide feedback to those organizations that have a need to know about the outcome of the ECP process;

- document that an individual, office, or organization has accepted responsibility for minimizing, correcting, and preventing recurrence of concerns that have been substantiated through the ECP process;
- prepare quarterly and annual reports and review them for lessons learned and possible adverse trends;
- use self-assessments or outside reviews to conduct management assessments of their ECPs; assess the results with the HQ or field element manager, and take any necessary actions to improve program operations;
- coordinate with DOE contracting officers to determine the existence of contract requirements for the establishment of contractor ECPs and the means and criteria by which such contractor ECPs will be evaluated;
- advise appropriate levels of management when actions are either ineffective or not timely in resolving concerns or correcting identified deficiencies.

h. Describe how employee concerns are reported, processed, and documented as stated in DOE O 442.1A and the DOE G 442.1-1, Department of Energy Employee Concerns Program Guide.

Reporting

Section 4 of DOE G 442.1-1 addresses reporting of employee concerns. It reads as follows:

> Employees are responsible for reporting conditions that adversely affect the quality or safety of DOE operations and for identifying and preventing harassment and intimidation of coworkers.

Concerns Processing

Concerns must be processed in one of the following manners:

- Investigated or otherwise evaluated through the ECP, in coordination with DOE or external offices when required
- Referred to other offices or programs and tracked by the ECP until they are resolved
- Transferred to another DOE or contractor organization with jurisdiction over the issues when those issues are outside the scope of the ECP

Personnel from ECP must document employee concerns in sufficient detail to permit investigation or other appropriate levels of review. Concerns must be tracked until closure. Unless otherwise agreed to by the employee, an organization other than that of the employee's immediate supervisor must conduct the investigation. Similarly, individuals or organizations outside the concerned employee's organization should not be selected to conduct the investigation where their involvement presents a conflict of interest.

If the concerned employee requests confidentiality, his or her identity must not be disclosed during the investigation or other process used to evaluate the concern. However, ECP personnel should advise employees of the limitations of its ability to protect confidentiality under certain circumstances. ECP personnel must evaluate and attempt to resolve employee concerns in a manner that protects the health and safety of both employees and the public, ensures effective and efficient operation of programs, and uses alternative dispute resolution techniques whenever appropriate. ECP personnel must immediately report to an appropriate line manager and/or the ES&H program office those concerns that involve an imminent

danger or condition or a serious condition. Appropriate offices must determine if DOE or its contractors have taken action to minimize, correct, or prevent recurrence of program, process, or management weaknesses identified and substantiated through the ECP. Reports of concerns must be reviewed for classified information and, if classified, sanitized by an authorized classifier.

Closure

An employee concern case is designated as closed when one of the following occurs:

- The concern has been investigated; necessary corrective actions have been identified; the office responsible for taking the corrective action has accepted jurisdiction over the matter; and the resolution has been documented in a formal tracking system.
- The concern has been investigated and no corrective action is deemed necessary.
- The subject matter of the concern is outside the scope of the ECP and the concern has been transferred to another organization with jurisdiction over the subject matter.
- Personnel from ECP have advised an employee raising a concern that is outside the scope of the ECP of available means to have the concern addressed, if direct transfer of the concern to another organization is not appropriate.
- The ECP determines that the issues are frivolous or too general to investigate.
- The concerned employee has been notified that the concern has been closed.

If the ECP does not resolve a concern to the satisfaction of the concerned employee, the concerned employee must be advised if there are any offices with authority or responsibility for addressing the subject matter of the concerns.

Documentation and Records

At a minimum, the ECP office must prepare and maintain the following records:

- Concern log
- Concern reports
- Concern investigation and resolution summaries, including a description of the basis for closing the concern
- Management assessment results
- Quarterly and annual reports

Personnel from ECP must submit quarterly and annual reports to the head of the field element and the Office of Employee Concerns. The reports must address the following:

- Employee concerns activity levels for the period
- Nature of the concerns
- Resolution of the concerns
- Other information required under ECP directives for the effective coordination of ECPs

In maintaining ECP records, steps must be taken to protect the identity of the concerned employee consistent with the employee's request for confidentiality and the provisions of the Privacy Act and the Freedom of Information Act.

Federal records cannot be destroyed unless authorized by the Archivist of the United States, NARA. Authorities are found in the General Records Schedule of the Government, as issued by NARA, and in NARA-approved DOE records disposition schedules. Should any or all

ECP records not be covered by authorized records disposition schedule, the responsible ECP manager must seek NARA authorization through the cognizant local records officer in liaison with the departmental records officer.

i. Describe the criteria for designating and processing occupational health and safety concerns.

Concerns are designated for processing according to the criteria established by the HSS. An employee concern involving an imminent danger condition/concern or serious condition/concern will be immediately brought to the attention of the appropriate line manager and/or the HSS program office for evaluation and action. The ECP must ensure that an initial determination of the health and safety significance of the concern is performed. Priorities for resolution must be established based on determination of the risk of the concern. Generic guidance for safety significance is provided below; however, for occupational safety and health concerns, additional classifications follow.

The following HSS guidelines are intended to be illustrative, not all-inclusive, of criteria that should be used to assess the significance of the concern. The degree to which a concern involves an imminent danger or condition is judged by determining if the concern involves any of the following criteria:

- Initiation of work in the face of identified environmental, safety, or health concerns that could result in an immediate or near-term threat to the safety or health of the public or workers
- Continuation of operations in the face of inoperable or deficient environmental, safety, and health equipment, monitoring instrumentation, or systems
- Violations of the PAAA enforcement authority; criminal acts involving nuclear safety matters (e.g., falsification of facility logs and records); willful violations of regulations, DOE directives, operating procedures, or specifications; or other criminal acts
- Deficiencies observed in the normal reporting system (e.g., lack of notification of environmental, safety, or health issues and events of significance to proper authorities as required by DOE Orders, procedures, or Federal and state environmental laws)
- Collection, dissemination, and recording of inaccurate or falsified environmental-, safety-, or health-related data
- Material misrepresentations to inspectors, auditors, or reviewers when performing official duties

Imminent Danger Condition/Concern

Any condition or practice in any workplace that creates a danger that could reasonably be expected to cause death or serious physical harm immediately or before the onset of the danger could be eliminated through the normal procedural mechanism. HSS requires that such concerns be investigated within 24 hours.

Serious Condition/Concern

A hazard, violation, or condition that causes a substantial probability that death or serious physical harm, property loss, and/or environmental impact could result. HSS requires that such concerns be investigated within 3 working days.

Other-Than-Serious Condition/Concern

Hazards, violations, or conditions that may not result in death or serious physical harm, property loss, and/or environmental impact but may have a direct and immediate relationship to worker safety and health or the environment. HSS requires that such concerns be investigated within 20 working days.

References: DOE M 411.1-1C

j. Participate in an assessment of worker protection standards at a given facility or site and report the results to senior Federal and contractor management.

Note: This element is performance based. The Qualifying Official will evaluate its completion. Title 10 CFR 851.20 outlines management requirements for a worker program at a given facility or site, against which criteria may be assessed.

9. An STSM shall have a working level knowledge of the Department's Emergency Management resources, including emergency plans, external agency involvements, interagency relationships, and the command and control function during an emergency.

a. Discuss the Department's three-tiered organizational approach to managing Operational Emergencies.

The DOE Comprehensive Emergency Management System is a three-tiered organizational approach to forming an integrated departmental ERO structure. Responsibility begins at (1) the facility or event scene level and rises through (2) the cognizant site office to (3) the HQ EMT. At each tier there is a designated ERO responsible for responding to and minimizing or mitigating the effects of operational emergencies.

References: DOE G 151.1-1, vol. 3-1

b. Discuss the roles and responsibilities of the Departmental elements for management of the Department's Emergency Management System as defined in DOE O 151.1C, Comprehensive Emergency Management System.

Roles and Responsibilities

The following roles and responsibilities related to the management of emergency management systems apply to departmental elements:

- Implement emergency management policy and requirements, and maintain programs and systems consistent with the policy and the requirements.
- Establish and maintain an effective, integrated emergency management program.
- Partner with the CSOs, the Associate Deputy Secretary for Field Management, the Assistant Secretary for Environment, Safety, and Health, and the Director of Emergency Management to establish and maintain performance measures and criteria to implement this Order for facilities and activities under their cognizance, and to ensure that these performance measures and criteria are incorporated in contractual arrangements.
- Approve and submit approved site emergency plans to the Director of Emergency Management and the CSO(s).

- Approve and submit approved emergency planning zones to the Assistant Secretary for Environment, Safety, and Health; the Director of Emergency Management; and the CSO(s).
- Coordinate with the CSO(s) to ensure resources are available to implement this Order for facilities and activities under their cognizance.
- Ensure development of appropriate emergency plan implementing procedures for timely and accurate emergency classification, notification, and reporting of emergency events for facilities under their cognizance; establish pre-authorization criteria when possible.
- Ensure emergency public information planning is integrated with the development and maintenance of emergency plans.
- Ensure effective communication systems and protocols are coordinated and maintained with the HQ emergency operations center regarding emergencies involving or affecting facilities or materials under DOE jurisdiction or requiring DOE assistance.
- Review and approve ERAPs that cover facilities under their supervision; prepare the operations/field office annual emergency readiness assurance plan; and submit it to the CSO and the Director of Emergency Management for inclusion in the annual report of the Under Secretary on the status of the emergency management system.
- Where applicable, pre-designate a DOE employee as the on-scene coordinator for Federal responses under the National Contingency Plan and as the on-scene commander and/or senior energy official in accordance with the Federal Radiological Emergency Response Plan.
- Participate in the development and implementation of mutual assistance agreements with state, tribal, and local authorities.
- Ensure that hazard assessments and hazard surveys for emergency planning purposes are adequately performed and documented.
- Ensure site offices and contractors participate in a continuing emergency preparedness program of training, drills, and exercises.
- Conduct periodic assessments of facility emergency management programs and/or periodically review contractor self-assessment programs to ensure compliance with DOE directives and policy; provide the results/conclusions to the CSO and the Director of Emergency Management; ensure a maximum of one assessment per site per year.
- During an emergency, conduct appropriate and necessary emergency actions.
- Implement corrective actions for lessons learned from actual emergency responses and based on findings from evaluations, assessments, and appraisals.
- Establish and maintain an emergency operations center to respond to emergency events. Every DOE emergency operations center should be equipped with compatible communication, photo/video, and automatic data processing support specified by the Director of Emergency Management.
- Ensure that emergency plans and procedures are prepared, reviewed annually, and updated, as necessary, for all facilities under their purview and are integrated within the overall site office emergency preparedness program.
- Assign senior representatives to the Emergency Management Advisory Committee.
- Develop, implement, maintain, and update, as necessary, an emergency management program, commensurate with the facility-specific hazards and consistent with departmental directives and standards of performance.

- Prepare and maintain emergency plans, procedures, and technical resource capabilities that address emergency classification, notification, reporting, response actions, training and drills, exercises, emergency public information, outreach and coordination, accident investigation, and applicable Federal Statutes, state and local laws, DOE Orders, and implementing regulations and guidance.
- Direct appropriate emergency response actions within the area under their control and at the scene of the emergency.
- Ensure the effectiveness of a continuing emergency preparedness program.
- Establish and maintain an internal assessment program to ensure the readiness of emergency response capabilities, including developing and conducting a self-assessment program, as well as establishing systems and measures to monitor and evaluate line performance.

c. Define "operational emergencies" and the circumstances to which they apply as defined in DOE O 151.1C, Comprehensive Emergency Management System.

Operational emergencies are unplanned, significant events or conditions that require time-urgent response from outside the immediate/affected site/facility or area of the incident. Such emergencies are caused by, involve, or affect DOE facilities, sites, or activities. Incidents that can be controlled by employees or maintenance personnel in the immediate/ affected facility or area are not operational emergencies. Incidents that do not pose a significant hazard to safety, health, and/or the environment and that do not require a time-urgent response are not operational emergencies.

d. Discuss the concept of Emergency Public Information (EPI) and the different roles of the Department's Public Relations Office and the Joint Information Center in disseminating information in an emergency.

Emergency Public Information

The ability to provide the public, the media, and DOE employees with accurate and timely information is based on an effective EPI program. To be effective, emergency public information should be coordinated with onsite and offsite Federal, state, local, and tribal EROs. The EPI program provides the means for a facility to coordinate the timely exchange of information among representatives of DOE with other organizations. This coordination is critical to prevent dissemination of confusing, conflicting, and erroneous information.

Departmental and emergency response credibility is enhanced through an effective EPI program, which is based on a day-to-day public information operation that can be expanded for an emergency response. This capability to expand is developed in cooperation with onsite and offsite organizations through the detailed planning and coordination of plans, procedures, education, and training.

Joint Information Center

The JIC accommodates the news media, coordinates news conferences, provides media kits and news releases to the media and assists the JIC manager in all matters pertaining to interaction with the media. It serves as an extension of the JIC manager by tracking inquiries between the EOC and the JIC, keeping the public and media inquiry teams updated on emergency events, ensuring that the JIC manager has adequate review of information prior to

media briefings ensuring that communications are maintained with the EOC, and remaining in direct communication with the JIC manager.

References: DOE G 151.1-1, vol. 4-4
DOE O 141.1

e. Discuss the involvement of external agencies in the Department's Emergency Management System.

Agencies and organizations responsible for protecting the public and the environment within the vicinity of the facility/site should be identified. These agencies and organizations should be contacted to determine authorities, responsibilities, notification procedures, and information necessary in the event of an emergency at the DOE facility. Requirements identified during the hazard survey and/or hazard assessment process should be used to help determine all necessary local, state, and Federal interfaces.

References: DOE O 151.1C

f. Describe the contents of, the requirements for, and where each of the following types of emergency plans can be located on-site:

- **Site Emergency Plan;**
- **Facility Emergency Plan;**
- **Building Emergency Plan;**
- **Security Emergency Plan;**
- **Fire Prevention/Suppression Plan;**
- **Worker Safety Plan; and**
- **Continuity of Operations Plan**

The responses to this competency element will be site specific. Contact your local emergency management team for information.

Additionally, Federal Preparedness Circular (FPC) 65, issued by FEMA, states, "It is the policy of the United States to have in place a comprehensive and effective program to ensure continuity of essential Federal functions under all circumstances." To support this policy, the Federal Executive Branch implemented the Continuity of Operations Program (COOP). COOP is defined as the activities of individual departments and agencies and their sub-components to ensure that their essential functions are performed. This includes plans and procedures that delineate essential functions; specify succession to office and the emergency delegation of authority; provide for the safekeeping of vital records and databases; identify alternate operating facilities; provide for interoperable communications; and validate the capability through tests, training, and exercises. All Federal agencies, regardless of location, should have in place a viable COOP capability to ensure continued performance of essential functions from alternate operating sites during any emergency or situation that may disrupt normal operations.

DOE N 150.1, *Continuity of Operations*, states that all Federal departments and agencies are required to establish the capability to continue essential Federal Government functions as necessary to meet civilian and defense needs during any emergency, including natural disasters, accidents, military or terrorist attacks, and technological emergencies. This

requirement also applies to Agency and Department subcomponents such as DOE field elements.

The DOE COOP manager will develop an overarching DOE COOP plan based on the Department's essential functions identified in attachment 2 of DOE N 150.1. The DOE COOP plan will address all of the program elements specified in FEMA FPC 65.

Each primary DOE organization must develop a COOP implementation plan to support execution of the Department's essential functions and implementation of the DOE COOP plan.

Each DOE field element (this term includes operations offices, service centers, site offices, area offices, and regional offices of Federally staffed laboratories) must develop a COOP plan that addresses the elements in FEMA FPC 65.

The degree of field element COOP planning will be commensurate with that field element's role in supporting execution of the Department's essential functions and the extent to which an event directly affecting the field element would impact the continuity of both departmental and local essential functions.

Mandatory Performance Activities:

a. Complete Emergency Manager Training or Emergency Operations Center (EOC) training.

b. Participate in the EOC during a site emergency management drill.

c. Complete and pass the Federal Emergency Management Administration (FEMA) Emergency Management Institute IS-00700 National Incident Management System (NIMS) and Introduction course.

Note: The mandatory performance activities listed in elements a through c are performance based. The Qualifying Official will evaluate the completion of these activities.

10. An STSM shall have working level knowledge of conduct of operations.

a. Describe the reason for implementing conduct of operations at DOE facilities.

It is the policy of the Department that the conduct of operations at DOE facilities be managed consistent with the requirements of DOE Order 5480.19, so that

- operations at DOE facilities are conducted in a manner to assure an acceptable level of safety;
- operators at facilities have procedures in place to control the conduct of their operations;
- line organizations review existing and planned programs for safe and reliable facility operations;
- line organizations assess the effectiveness of corporate directives, plans, or procedures at facilities under their cognizance.

b. Discuss the requirements for implementing conduct of operations at DOE facilities and the associated impact on safety and efficiency of operations.

Contractors should use conduct of operations in the review and development of existing and proposed directives, plans, or procedures relating to the conduct of operations at DOE facilities.

A graded approach should be used in the application of the guidelines to ensure that the depth of detail required and the magnitude of resources expended for operations are commensurate with each facility's programmatic importance and potential environmental, safety, and/or health impact.

Conformance with conduct of operations requirements should be documented. However, it is not necessary to develop a separate manual or plan. As a minimum, a document (e.g., a matrix) should be prepared, in coordination with the head of the field element and the cognizant program Secretarial Official(s), that

- indicates whether a specific guideline applies to a facility;
- indicates where and how each of the guidelines (attachment I of DOE Order 5480.19) is applied within the contractor's existing policies and procedures;
- identifies any deviations or exemptions from the guidelines.

The head of the field element as a minimum should approve this document.

c. Discuss the purpose and describe the roles and responsibilities of the STSM in implementing DOE O 5480.19, Conduct of Operations Requirements for DOE Facilities.

Purpose

The purpose for implementing the Conduct of Operations Requirements is found in the beginning of the Order, stated here:

> To provide requirements and guidelines for Departmental Elements, including the National Nuclear Security Administration (NNSA), to use in developing directives, plans, and/or procedures relating to the conduct of operations at DOE facilities. The implementation of these requirements and guidelines should result in improved quality and uniformity of operations.

Roles and Responsibilities of the STSM

STSMs

- ensure that adequate contractor plans, procedures, and programs are in place and assess the effectiveness of their implementation at sites under their jurisdiction, consistent with the provisions of the Order;
- ensure that DOE facility representatives are assigned responsibility for a major facility or group of lesser facilities, and oversee the day-to-day conduct of operations at these facilities in accordance with the requirements of the Order and the direction received from the program manager;
- approve documentation prepared by the contractor to demonstrate conformance to the guidelines in attachment 1 of the Order.

d. Discuss the concept of graded approach and how it applies to the implementation of conduct of operations.

A graded approach ensures that the depth of detail required and the magnitude of resources expended for operations are commensurate with each facility's programmatic importance and potential environmental, safety, and/or health impact. With respect to application to conduct of operations, this approach provides for an efficient use of available resources while meeting the needs of the operation.

DOE sites and DOE line management must have effective processes for communicating issues up the management chain to senior management using a graded approach that considers hazards and risks. The processes must provide sufficient technical basis to allow managers to make informed decisions.

References: DOE O 226.1

e. For each of the 18 chapters in Attachment I to DOE O 5480.19, describe how each activity contributes to an effective and safe operational environment.

Chapter 1 - Operations Organization and Administration

This chapter describes the administrative controls and practices that, when fully implemented, result in an effective and safe operational environment. Beginning with DOE facility policies that describe the philosophy of standards of excellence under which the facility is operated and establish clear lines of responsibility for normal and emergency conditions, other principles are suggested for the control of operations. These are establishing written standards for operations, providing adequate resources to permit effective implementation, periodically monitoring and assessing performance, and holding personnel accountable for their performance.

These administrative controls put into place a system whereby operational effectiveness and safety can be measured and analyzed. The development and implementation of corrective actions follow. Continuous improvement in efficiency and safety is thus achieved in accordance with total quality management principles.

Chapter 2 - Shift Routines and Operating Practices

This chapter describes some important aspects of routine shift activities and watch-standing practices that promote the professional conduct of operations personnel and result in meeting DOE and facility management expectations for operator performance. Professional conduct and good watch standing practices result in appropriate attention to facility conditions, a necessary part of maintaining a safe and effective operational environment. Key elements are effective equipment monitoring to detect abnormal conditions or adverse trends, notifying supervisors promptly of unusual or unexpected situations, understanding equipment status and operational authority, and following proper industrial safety, radiological protection (if applicable), and quality assurance practices.

The chapter specifically provides guidelines for status practices, safety practices, operator inspection tours, use of round/tour inspection sheets, personnel protection, response to

indications, resetting protective devices, load changes, authority to operate equipment, shift operating bases, and potentially destructive written material and devices.

Chapter 3 - Control Area Activities

This chapter recognizes the control area or control room as the most critical facility operating base and the coordination point for all important facility activities. It stresses principles involving limited control area access, professional behavior of personnel in the control area, monitoring of main control panels, control operator ancillary duties, and operation of control area equipment. Identifying these critical principles helps to contribute to the efficiency and safety of the operation, as personnel have specific information important to that goal.

Chapter 4 - Communications

This chapter describes the important aspects of a plant program for audible communications and emphasizes that accurate communications are essential for the safe and efficient operation of facilities. Audible communications are used to transmit operating and emergency information within the facility. Examples are oral (face-to-face), telephone, radio, and public address (page) announcements; sound-powered phones; and special sounds (horns and bells). Guidance provided includes the practice of repeating back instructions to ensure accurate transmission and receipt of verbal instructions, use of standardized terminology, and use of a phonetic alphabet. Inadequate communication is a common root cause behind operator error. On the softer side, personnel morale, which can indirectly affect facility efficiency and safety (consider incidents of sabotage, equipment tampering, and malicious compliance), depends on open, honest, and clear communications.

Chapter 5 - Control of On-Shift Training

The guidelines of this chapter relate to control of training activities by operations personnel. On-shift training should be conducted so that the trainee satisfactorily completes all of the required training objectives and receives maximum learning benefit from this experience without unduly affecting normal operations, thus contributing to the safer and more efficient operation of the facility. Facility operation by personnel under instruction should be carefully supervised and controlled to avoid mistakes in operations by unqualified personnel and to use trainees' time effectively. These controls are therefore necessary to maintain safe and efficient operation of the facility during the conduct of hands-on training. The following are key elements: adherence to formal training programs, use of instructors that are qualified themselves on the subject equipment, supervision and control of trainees by qualified operators, operator qualification program approval, formal training documentation, suspension of training during abnormal or accident conditions, and establishing a maximum number of trainees at one time.

Chapter 6 - Investigation of Abnormal Events

This chapter covers important aspects of the abnormal event investigation program. Abnormal events do occur and when they do, they often cause an impact on the safe and efficient operation of the affected facilities. Therefore, a program for the investigation of abnormal events should ensure that facility events are thoroughly investigated to assess the impact of the event, to determine the root cause of the event, to ascertain whether the event is reportable to DOE, and to identify corrective actions to prevent recurrence of the event. As

future events are prevented through successful implementation of this program, the safe and efficient operation of the facility is improved.

Chapter 7 - Notification

This chapter provides guidelines to ensure uniformity, efficiency, and thoroughness of notifications that support fulfillment of DOE requirements. Proper notifications of abnormal or unusual events contribute to safe and efficient operation of the facility in two ways. The first is that the notification results in the involvement of a larger pool of people whose knowledge can help stabilize and resolve the immediate situation at hand. The second is that being trained to follow a rigorous notification process ensures that vital information, needed to analyze and prevent recurrence, is not overlooked.

Chapter 8 - Control of Equipment and System Status

This chapter provides an overall perspective on control of equipment and system status. Control of equipment and system status contributes to safe and efficient facility operations by ensuring that an adequate "safety envelope" exists to authorize and perform work. A facility's safety envelope is defined by the proper operation and configuration of a set of equipment considered vital to a safe operating environment. This equipment is termed "vital safety equipment." If a piece of equipment fails or is shut down for maintenance, this fact needs to be recorded so that affected operations can be terminated or prevented until the equipment or system is restored. In the case where redundant equipment exists that could be operated to maintain the safety envelope for continued operations, its status must be known in order for it to be relied upon. Temporary modifications must also be tracked for the same reasons.

Chapter 9 - Lockouts and Tagouts

This chapter describes the important elements of a lockout/tagout program and is intended to meet the requirements of 29 CFR 1910. A safe and efficient operational environment is maintained by providing a method for equipment status control through component tagging or locking that should protect personnel from injury, protect equipment from damage, maintain operability of plant systems, and maintain the integrity of the physical boundaries of plant systems. Appropriate and proper use of tags and locks prevents inadvertent operation of equipment when there is a potential for equipment damage or personnel injury during equipment operation, servicing, maintenance, or modification activities.

Chapter 10 - Independent Verification

This chapter describes the important aspects of an independent verification program that when implemented should provide a high degree of reliability in ensuring the correct facility operation and the correct position of components such as valves, switches, and circuit breakers. This is important to the safe and efficient operation of a facility because independent verification recognizes the human element of component operation; that is, any operator, no matter how proficient, can make a mistake. Thus, when mistakes are found and corrected before an operation takes place, safety and efficiency are improved.

Chapter 11 - Logkeeping

This chapter describes the features needed in the operations logs to ensure they are properly maintained. Operations logs should be established for all key shift positions and should

contain a narrative of the facility's status and all events, as required to provide an accurate history of facility operations. Proper logkeeping is essential to the safe and efficient operation of a facility because it provides the data necessary for the reconstruction of abnormal or unusual events. When the data is properly analyzed and corrective actions are taken, recurrence of the event should be prevented. Logkeeping also promotes personal accountability and improved communication of information about the facility's status among operating personnel.

Chapter 12 - Operations Turnover

This chapter describes the important aspects of a good shift turnover. The comprehensive transfer of information pertinent to the operation of the facility is vital to safe and efficient operations, as evidenced by a historically high error rate associated with poor shift turnovers resulting from improper reviews of logs, unclear communications, and neglecting to discuss key operating parameters and status. Safe operations also depend on operating personnel being fit for duty. Therefore, it is also the responsibility of the off-going person to determine this by looking for evidence of sickness with corresponding degradation of mental or physical ability to do the job due to the sickness itself and/or the effects of medication the person might be taking. Other compromising conditions such as drug and alcohol abuse should also be considered among the things to look for.

Chapter 13 - Operations Aspects of Facility Chemistry and Unique Processes

This chapter describes the important aspects of operations involving chemistry and unique processes and their relationship to safe and efficient facility operation. Operational monitoring of facility chemistry or unique process data and parameters should ensure that parameters are properly maintained. Proper monitoring will identify problems before components or safety are adversely affected. Operating personnel must be knowledgeable about the chemicals and processes they are working with and depending upon so that they can detect and correct off-normal parameters in a timely manner, thus improving the efficiency and safety of the operation.

Chapter 14 - Required Reading

This chapter describes an effective required-reading program. Such a program contributes to facility safety and efficiency by ensuring that appropriate individuals are made aware of important information that is related to job assignments. Procedure changes, equipment design changes, related industry and in-house operating experience information, and other information necessary to keep operations department personnel aware of current facility activities are examples of the kind of useful information that should be made available to keep operating personnel current.

Chapter 15 - Timely Orders to Operators

This chapter describes the key features of an effective operator orders program. This contributes to safe and efficient operation by providing a means for communicating current, short-term information and administrative instructions to operations personnel. This becomes necessary to accommodate the changing needs and requirements of DOE facility operations. For example, orders could include instructions on the need for and performance of specific evolutions or tests; it could also include work priorities, announcements of policy information, and administrative information. Typical information includes special

operations, administrative directions, special data-collection requirements, plotting process parameters, and other similar short-term matters.

Chapter 16 - Operations Procedures

This chapter describes the important aspects of operations procedure development and use. Operations procedures should provide appropriate direction to ensure that the facility is operated within its design basis and should be effectively used to support safe operation of the facility. When operations personnel adhere to the policy to follow approved, properly written procedures, their operational performance should be consistent and safe.

Chapter 17 - Operator Aid Postings

This chapter describes the important aspects of an operator aid program. Facility operator aids (information posted for personnel use) should provide information useful to operators in performing their duties and thus provide an important function in the safe operation of the facility, provided that they are kept current and do not conflict with any other controlled procedure or information. Examples are copies of procedures (portion or pages thereof), system drawings, handwritten notes, information tags, curves, and graphs.

Chapter 18 - Equipment and Piping Labeling

This chapter describes the important aspects of a labeling program. A well-established and maintained equipment-labeling program should help ensure that facility personnel are able to positively identify equipment they operate. It will enhance training effectiveness, help reduce operator and maintenance errors resulting from incorrect identification of equipment, and reduce personnel radiation and other hazardous material exposure as operators spend less time identifying components, thus increasing the efficiency and safety of the facility.

f. Describe the types of operations where formal conduct of operations apply.

Operations where formal conduct of operations apply range from large, permanent DOE test or production facilities to small research or testing facilities. Experience has shown that the better operating facilities have well-defined, effectively administered policies and programs to govern the activities of the operating organization. Formal conduct of operations procedures are prepared to assist facilities in the review and development of programs important to operations. Not all activities in the operations area are addressed. Some areas, such as the technical aspects of specific equipment operation, are not included because they involve facility-specific situations requiring unique direction. However, conduct of operations should support or complement performance in the areas not addressed by any other formal safety effectiveness program.

References: DOE Order 5480.19

g. Discuss how the self-assessment process is applied to ensure safe operations.

The same basic process that is used for assessing the contractor or another organization is used for performing self-assessments, except that the focus is inward for the purpose of self-improvement per total quality management concepts. Specifically, the process should include a review of past assessments and actions taken/completed to resolve findings, development of an assessment plan, making observations, conducting interviews, reviewing

program documents, "pulling the string," and assembling and reporting findings. The following describes some principles involved in performing independent (self-) assessments:

- A process of planned and periodic independent assessments should be established and implemented by an independent assessment organization. Independent assessments should focus on improving items and processes by emphasizing a line organization's achievement of quality.
- Personnel performing independent assessments should act in a management advisory function. Their responsibilities are to monitor work performance, identify abnormal performance and precursors of potential problems, identify opportunities for improvement, report results to a level of management having the authority to effect corrective action, and verify satisfactory resolution of problems.
- Personnel performing independent assessments should be technically knowledgeable and focus on improving the quality of the processes that lead to the end product.
- Personnel performing independent assessments should not have direct responsibilities in the area they are assessing.
- Independent assessments should be conducted using criteria that describe acceptable work performance and promote improvement.
- Scheduling of assessments and allocation of resources should be based on the status, risk, and complexity of the item or process being assessed. Scheduling should be flexible, and additional attention should be given to areas of questionable performance.
- Assessment results should be tracked and resolved by management having responsibility in the area assessed. Follow-up review of deficient areas should be initiated as necessary.
- Responses to assessments should include the following, as applicable: actions to correct the deficiency; cause identification; actions to prevent recurrence; lessons learned; and actions to be taken for improvement.

Applying some or all of these principles will provide a meaningful self-assessment that should lead to a safer operation.

References: DOE Order 5480.19

h. Working with a qualified DOE Facility Representative in a given facility, review/assess the conduct of operations or work in progress in the facility. Develop a report of your findings and discuss it with the contractor facility management.

Note: This element is performance based. The Qualifying Official will evaluate its completion.

11. An STSM shall have a working level knowledge of waste management principles and practices.

a. Discuss awareness of definitions of the following types of waste that may be provided in Federal laws and regulations:

- **Low-level waste;**
- **High-level waste;**

- **Transuranic waste; and**
- **Mixed waste**

Low-Level Waste

As found in DOE M 435.1-1, "low-level waste is radioactive waste that is not high-level radioactive waste, spent nuclear fuel, transuranic waste, byproduct material (as defined in section 11.e(2) of the *Atomic Energy Act of 1954,* as amended), or naturally occurring radioactive material. [Adapted from: *Nuclear Waste Policy Act of 1982,* as amended]"

Examples can include radioactively contaminated industrial or research waste such as

- paper,
- rags,
- plastic bags,
- personal protective equipment, and
- water-treatment residues.

High-Level Waste

As found in DOE M 435.1-1, "high-level waste is the highly radioactive waste material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and other highly radioactive material that is determined, consistent with existing law, to require permanent isolation. [Adapted from *Nuclear Waste Policy Act of 1982,* as amended]"

Examples include

- liquid waste directly produced in reprocessing
- any solid material derived from the liquid wastes having a sufficient concentration of fission products.

Transuranic Waste

As found in DOE M 435.1-1,

> Transuranic waste is radioactive waste containing more than 100 nanocuries (3700 becquerels) of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years, except for (1) high-level radioactive waste; (2) waste that the Secretary of Energy has determined, with the concurrence of the Administrator of the Environmental Protection Agency, does not need the degree of isolation required by the 40 CFR Part 191 disposal regulations; or (3) waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61. [Source: *WIPP Land Withdrawal Act of 1992,* as amended]

Mixed Waste

As found in DOE M 435.1-1, mixed waste is

> Waste that contains both source, special nuclear, or by-product material subject to the *Atomic Energy Act of 1954*, as amended, and a hazardous

component subject to *the Resource Conservation and Recovery Act*. [Adapted from *Federal Facility Compliance Act of 1992*]

b. Discuss the Department's policies and practices regarding the handling and management of waste as described in DOE O 435.1, Radioactive Waste Management.

DOE radioactive waste management activities should be systematically planned, documented, executed, and evaluated. Radioactive waste should be managed to

- protect the public from exposure to radiation from radioactive materials;
- protect the environment;
- protect workers;
- comply with applicable Federal, state, and local laws and regulations.

All radioactive waste should be managed in accordance with the requirements in DOE M 435.1-1, *Radioactive Waste Management Manual*.

DOE, within its authority, may impose such requirements, in addition to those established in this Order, as it deems appropriate and necessary to protect the public, workers, and the environment, or to minimize threats to property.

c. Discuss the Department's performance objectives and performance assessment requirements as outlined in DOE O 435.1.

While DOE O 435.1 does not provide specific performance objectives or performance assessments, within its requirements it states "All radioactive waste shall be managed in accordance with the requirements in DOE M 435.1-1, *Radioactive Waste Management Manual*."

The following objectives and assessment requirements are taken from that manual.

Performance Objectives

The objective of this Order is to ensure that all DOE radioactive waste is managed in a manner that is protective of worker and public health and safety, and the environment.

Performance Assessment

Performance assessments should address reasonably foreseeable natural processes that might disrupt barriers against release and transport of radioactive materials. Performance assessments should use DOE-approved dose coefficients (dose conversion factors) for internal and external exposure of reference adults. The performance assessment should include a sensitivity/uncertainty analysis. Performance assessments should include a demonstration that projected releases of radionuclides to the environment should be maintained as low as reasonably achievable. For purposes of establishing limits on radionuclides that may be disposed of near-surface, the performance assessment should include an assessment of impacts to water resources. For purposes of establishing limits on the concentration of radionuclides that may be disposed of near-surface, the performance assessment should include an assessment of impacts calculated for a hypothetical person assumed to inadvertently intrude for a temporary period into the low-level waste disposal

facility. For intruder analyses, institutional controls should be assumed to be effective in deterring intrusion for at least 100 years following closure. The intruder analyses should use performance measures for chronic and acute exposure scenarios, respectively, of 100 mrem (1 mSv) in a year and 500 mrem (5 mSv) total effective dose equivalent excluding radon in air.

d. Discuss the Department's policies on waste management, including:
- **Generation reduction;**
- **Segregation;**
- **Minimization;**
- **Pollution prevention; and**
- **Disposal**

While there is no official waste management policy contained within DOE O 435.1, DOE M 450.4-1 (ISMS) does indicate performance objectives regarding radioactive waste minimization and management in a manner that meets regulatory requirements and is cost-effective. What follows are general comments regarding best practices and guidelines for their achievement.

Generation Reduction

All DOE low-level waste generators should establish auditable programs (goals, incentives, procedures, and reports) to assure that the amount of low-level waste generated and/or shipped for disposal is minimized.

Segregation

To the extent practical, waste should be segregated by type (sludge, salt, high activity, and low activity) to make accessibility for future processing easier.

Minimization and Pollution Prevention

Waste minimization and pollution prevention are implemented for radioactive waste management facilities, operations, and activities to meet the requirements of Executive Order 12856, "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements," and Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition."

Disposal

Disposal policy dictates that radioactive waste must be disposed of in a manner that protects the public, workers, and the environment and in accordance with a radioactive waste management basis. Disposal of high-level waste must be in accordance with the provisions of the Atomic Energy Act of 1954, as amended, the Nuclear Waste Policy Act of 1982, as amended, or any other applicable statutes.

e. Discuss how the following Acts apply to and impact the Department's waste management programs:
- **Federal Facilities Compliance Act (FFCA);**
- **Pollution Prevention Act of 1990 and**
- **Superfund Amendment Reauthorization Act**

Federal Facilities Compliance Act

The Federal Facilities Compliance Act of 1992 established that Federal facilities do not have sovereign immunity from state enforcement of state environmental laws under the solid and hazardous waste provisions of the Solid Waste Disposal Act (SWDA). Thus, Federal facilities are obligated to pay fines and penalties assessed by states. Additionally, provisions of the Act give EPA broader enforcement authority at Federal facilities. Specific to DOE, the Act includes a 3 year moratorium on enforcement of storage provisions for mixed hazardous and radioactive wastes. The Act created a new mixed-waste provision requiring reports on the national inventory of all mixed waste on a state-by-state basis and on the nation's inventory on mixed-waste treatment capacities and technologies.

The Act limits the civil liability of Federal employees acting within the scope of their official duties; however, it increases the potential criminal liability of Federal employees.

Pollution Prevention Act

The PPA states,

> . . . the Congress hereby declares it to be the national policy of the United States that pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner, whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner.

Based on DOE O 450.1 requirements, among others, pollution prevention efforts are mandated as being part of a site EMS, which is part of the site's ISMS.

Superfund Amendment Reauthorization Act

DOE O 451.1 requirements found in paragraph 5b must be adhered to as they relate to DOE activities. These requirements are in support and application of the EPCRA or Title III of Superfund Amendments and Reauthorization Act of 1986, 42 U.S.C. 11001, and the Pollution Prevention Act of 1990, 42 U.S.C. 13101, et seq.

f. Demonstrate an understanding of the general requirements of section 3116 of the 2005 National Defense Authorization Act regarding appropriate classification of waste.

The NDAA for FY 2005 states the following:

> IN GENERAL—Notwithstanding any other provision of law, with respect to material stored at a Department of Energy site at which activities are regulated by the State pursuant to approved closure plans or permits issued by the State, high-level radioactive waste does not include radioactive material resulting from the reprocessing of spent nuclear fuel that the Secretary of Energy determines

1. does not require permanent isolation in a deep geologic repository for spent fuel or highly radioactive waste pursuant to criteria promulgated by the Department of Energy by rule approved by the Nuclear Regulatory Commission;
2. has had highly radioactive radionuclides removed to the maximum extent practical in accordance with the Nuclear Regulatory Commission-approved criteria; and
3. in the case of material derived from the storage tanks, is disposed of in a facility (including a tank) within the State pursuant to a State-approved closure plan or a State-issued permit, authority for the approval or issuance of which is conferred on the State outside of this Act.

Therefore, section 3116 of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 authorizes the Secretary of Energy, in consultation with the Nuclear Regulatory Commission, to determine that certain waste from reprocessing spent nuclear fuel is not high-level waste and that it may instead be disposed of as low-level waste if it meets the criteria set forth in section 3116.

g. Demonstrate an understanding of the general requirements of the Resource Conservation and Recovery Act of 1976 as it applies to hazardous and mixed waste.

RCRA is a regulatory statute (40 CFR 260 through 40 CFR 267 pertain specifically to hazardous waste) designed to provide cradle-to-grave control of hazardous and mixed waste by imposing management requirements on generators and transporters of hazardous wastes and upon owners and operators of treatment, storage, and disposal facilities. RCRA applies mainly to active facilities and does not address abandoned and inactive sites. RCRA amended the Solid Waste Disposal Act; therefore, the two terms are sometimes used synonymously.

Title 40 CFR 124, subpart A declares that, as a matter of national policy, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible, and land disposal should be the least favored method for managing hazardous wastes. In addition, all waste that is generated must be handled so as to minimize the present and future threats to human health and the environment.

h. Discuss the process for determining whether or not waste is hazardous.

Hazardous wastes are those wastes that exhibit the characteristics of being corrosive, ignitable, reactive, toxic, or are listed in 40 CFR 261.3. Mixed hazardous waste is waste containing both radioactive and hazardous components as defined by the Atomic Energy Act of 1954 and RCRA, respectively. Based on these characteristics, and the extent to which they are present in a given waste sample, the determination regarding whether the waste is hazardous is made.

i. Describe the general requirements and issues associated with the transportation and packaging of radioactive wastes.

Type A Radioactive Material Packagings

In addition to packagings authorized by the hazardous materials regulations, each person who offers for transportation a type A quantity of radioactive materials also may use a commercially procured type A packaging, a package qualified as a type A packaging per DOT specification 7A (49 CFR 178) by an evaluation and testing program approved by the HQ certifying official, or a type B packaging certified by the HQ certifying official or the NRC. Packagings tested by and purchased from commercial sources do not require retesting by DOE contractors; however, the required documentation on design, testing, and use must be in the possession of the user.

Type B or Fissile Radioactive Material Packagings

In addition to packagings authorized by the hazardous materials regulations, each person who offers for transportation a type B and/or fissile quantity of radioactive materials also may use a packaging certified by the HQ certifying official or the NRC. NRC-certified type B and fissile packagings that have a current certificate of compliance may be used by DOE and DOE contractors only under the conditions specified in the certificate, and only after DOE is registered with the NRC as a user. Packagings that have a current DOE certificate of compliance issued by the HQ certifying official may be used by DOE and DOE contractors only under the conditions specified in the certificate.

Plutonium Packagings

Each person who offers plutonium for transportation in excess of 20 curies per package should use a packaging approved by the HQ certifying official or the NRC.

Each person who offers type B quantities of plutonium for air transportation should use a packaging approved by the HQ certifying official or the NRC.

References: DOE O 460.1B

j. Conduct an assessment of waste management practices at a given site/facility and prepare a report on how these practices can be improved.

Note: This element is performance based. The Qualifying Official will evaluate its completion.

12. An STSM shall have a working level knowledge of maintenance management as it relates to safety.

a. Describe DOE O 433.1, Maintenance Management Program for DOE, to explain:
- **DOE's role in the oversight of contractor maintenance operations;**
- **The intent of maintenance management programs;**
- **The Department's policy and objectives for maintenance management;**
- **The responsibilities and authorities for maintenance management programs.**

The Office of Regulatory Liaison assists the Office of Nuclear and Facility Safety Policy to develop rules, Orders, Policy, technical standards, and guidance for conducting maintenance activities at DOE nuclear facilities. Generally, all DOE contractors are required to maintain and preserve Government property per 48 CFR 45.509 and DOE O 430.1B, *Real Property Asset Management*. Maintenance programs are crucial in nuclear facilities to preserve the designed-in performance characteristics of mission-critical and vital safety structures, systems, and components. Nuclear facility maintenance programs are based on a documented safety analysis required by 10 CFR 830, subpart B. Additional maintenance management requirements are provided in DOE O 433.1, *Maintenance Management Program for DOE Nuclear Facilities*, and associated technical standards for maintenance, training of personnel, and conduct of operations.

Periodic inspections of structures, systems, components, and equipment, particularly those important to the safe and reliable operation of a facility, should be performed to determine whether deterioration is taking place and to identify and address technical obsolescence that threatens performance, safety, or facility preservation. Where the potential is identified for any event or condition to significantly affect safety margins, a formal program for resolving the problem should be documented and implemented.

The intent of maintenance management programs is to sustain property in a condition suitable for it to be used for its designated purpose and includes preventive, predictive, and corrective (repair) maintenance.

While the Order does not contain a specific policy statement, best practices dictate that

- the maintenance management program for all DOE property be consistent with this Order and that all DOE property be maintained in a manner that promotes operational safety, worker health, environmental protection and compliance, property preservation, and cost-effectiveness while meeting the programmatic mission;
- structures, systems, and components that are important to safe operation should be subject to a maintenance program in order to meet or exceed their design requirements throughout their life;
- periodic inspection of structures, systems, components, and equipment be performed to determine deterioration or technical obsolescence which threatens performance and/or safety;
- primary responsibility, authority, and accountability for the direction and management of the maintenance programs for all property reside with the line management assigned direct programmatic responsibility.

The objectives for maintenance management are to

- develop a cost-effective and efficient maintenance program for all DOE property that is consistent with DOE's mission, safety and health, reliability, quality, and environmental protection objectives;
- establish a review and analysis capability for evaluation of maintenance program performance and effectiveness;
- ensure the reliability, safety, and operability of structures, systems, and components;
- ensure compliance with environmental, safety, and health standards;
- ensure that the responsibility, authority, and accountability for maintenance are clearly defined and appropriately assigned;

- ensure that, where maintenance requirements or accepted maintenance standards cannot be met, such instances are appropriately documented and acknowledged by line management;
- ensure that sufficient resources are budgeted in a timely manner to accomplish the maintenance program;
- ensure that effective programs are in place to evaluate and measure property condition;
- ensure that a graded approach is taken by the line management in the development and implementation of maintenance programs;
- ensure that the maintenance of DOE property meets the equivalent guidelines, as appropriate, as required for the conduct of maintenance in commercial industry.

The responsibilities and authorities of managers of field elements for maintenance management programs are to

- ensure that adequate maintenance management programs and procedures are in place and implemented at sites under their jurisdiction and that the programs and procedures are consistent with the provisions of this Order;
- review the maintenance backlog and establish plans to ensure the backlog remains consistent with DOE goals and objectives;
- ensure that reviews and appraisals of contractor maintenance programs are performed to assess proper and consistent implementation of this Order, as specified in the site maintenance plan/maintenance implementation plan;
- review and approve the program implementation and baseline activities part of the site maintenance plans, and any subsequent modifications to those plans;
- review and approve contractor-generated nuclear facility maintenance implementation plans and any subsequent modifications to those plans;
- through the contracting officer, ensure that applicable contracts contain clauses that meet the policy and objectives of this Order;
- submit to field management and the appropriate heads of HQ elements, the site maintenance action plan part of the site maintenance plans.

b. Discuss the requirements for the control and integration of contractor and subcontractor personnel in maintenance activities.

Contractor and subcontractor personnel who perform maintenance or modifications on facility systems should be trained and qualified for the work they are to perform. These personnel should also receive general employee training and specific training in appropriate facility administration, safety, quality control, and radiation protection procedures and practices. Adequate time should be provided for this training. Recognition should be given to individual needs and previous training and experience. Experienced personnel could be allowed to bypass training by proving proficiency through examination and demonstration. Contractor and subcontract personnel who are not fully trained and qualified for the job to be performed should be continually supervised by qualified personnel. Contractor and subcontract personnel should perform maintenance under the same controls as and to the same high work standards expected of facility maintenance personnel. Contractor and subcontract managers and supervisors should be held accountable for the work performance of their personnel. Facility supervisors should review the work of these personnel during preparation for work, at the job site, and during post-maintenance testing and acceptance

inspections to the extent needed to enforce these requirements. Use of subcontractor personnel to perform routine facility maintenance should not normally be relied upon to the detriment of the development of permanent staff expertise.

References: DOE O 433.1

c. Discuss the graded approach process by which Department line management determines an appropriate level of coverage by facility maintenance management personnel.

By graded approach, DOE intends that the level of analysis, documentation, and actions necessary to comply with a requirement be commensurate with

- the relative importance to safety, safeguards, and security;
- the magnitude of any hazard involved;
- the stage of the facility's life cycle;
- the programmatic mission of the facility;
- the particular characteristics of the facility;
- any other relevant factor.

The sum of these considerations should dictate the appropriate level of coverage by facility maintenance management personnel.

References: 10 CFR 830

d. Discuss how maintenance activities interface with the following as each relates to safety:

- **Conduct of operations;**
- **Quality assurance;**
- **Configuration management;**
- **Safety SSCs;**
- **Authorization basis;**
- **Design basis;**
- **Suspect/counterfeit items.**

Conduct of Operations

Maintenance activities incorporate the concepts included in conduct of operations with matters related to the maintenance program. For example, the guidance provided for maintenance procedures is consistent with the procedure direction provided in DOE Order 5480.19. Additionally, the cultural aspects of conduct of operations is easily integrated into maintenance management. These are best business practices that should result in the high standard of maintenance performance required to support safe and reliable operations.

Quality Assurance

The concepts identified in DOE O 414.1C, *Quality Assurance*, were used in the development of the maintenance management program described in DOE O 433.1. The quality assurance requirements stipulated were established and integrated into the maintenance management program Order to ensure that risks and environmental impacts were minimized and that safety, reliability, and performance were maximized through the application of effective management systems commensurate with the risks posed by the facility and its maintenance

activities. Specifically, the principles of each quality assurance criteria, in the areas of management, performance, and assessment, were evaluated for inclusion into each maintenance management program element.

Configuration Management and Safety Structures, Systems, and Components

The configuration management process addresses material condition and aging management (MCA). MCA develops analytical methods and testing techniques that can be used to meet the requirements of the maintenance program. DOE-STD-1073-2003 outlines this process.

Configuration management programs also interface with the maintenance program through the change control and document control elements, which address control of hardware and procedure changes. The main interface is through the work control process of the maintenance program that manages and sequences maintenance activities in the field. Another important interface exists between the preventive and predictive maintenance activities and the performance monitoring function of the assessment element. Configuration control is maintained by ensuring that systems and equipment are restored to their original condition following maintenance.

Authorization Basis

The scope and the content of safety analysis reports include maintenance activities. The contractor takes the initiative to propose design, construction, operational, and maintenance commitments to ensure facility safety. For existing facilities, the current safety basis must include those considerations, constraints, and evaluation models needed for continuing engineering, maintenance, and management controls.

Design Basis

The current facility design basis requirements should be readily available to the maintenance staff. These requirements should be used in the preparation, review, and approval of proposed changes to plant design and maintenance procedures. In addition, these requirements should be used in troubleshooting problems and validating material condition assessment when questions arise. The organization responsible for controlling the design basis requirements and ensuring facility design integrity (i.e., the design authority) should be assigned the responsibility for interpreting design basis requirements as needed.

Suspect/Counterfeit Items

There is a program in maintenance management that ensures that deficient, nonconforming, counterfeit, or suspect items that are detected in a maintenance review are resolved in an effective and timely manner. Nonconforming, counterfeit, and suspect items are identified with tags or labels and controlled to prevent unauthorized use.

References: DOE O 425.1C
DOE O 440.1A

e. Review and evaluate the adequacy of a work package.

f. Observe in the field and evaluate the conduct of maintenance work utilizing a work package from start to finish.

Note: Elements e and f are performance based. The Qualifying Official will evaluate their completion.

13. An STSM shall have a working level knowledge of formal configuration management as it relates to safety.

a. Discuss the roles and responsibilities of the STSM related to implementing and maintaining configuration management programs.

The STSM should review the configuration management program to ensure that the program accomplishes the following:

- Establishes and documents the configuration baseline
- Institutes a configuration control system to ensure the review, approval, and documentation of changes
- Institutes a program of configuration audits to comply with the form and intent of the configuration

The STSM must enforce the requirements of DOE P 450.4, *Safety Management System Policy*, which states that DOE contractors are expected to use ISMS to integrate safety into all aspects of work planning and execution. All safety management systems and programs should be designed to fit together to permit safe and efficient performance. Consistent with that goal, configuration management should function as an integrated process that marries seamlessly with other safety management processes at the facility or activity, and not as a separate and distinct program. In addition, the contractor must flow-down the configuration management process to subcontractors and suppliers as appropriate to the work and ensure subcontractors and suppliers are implementing it appropriately.

b. Discuss the concept of configuration management and its importance in ensuring operational safety.

Configuration management is a management process that ensures that consistency is maintained among the requirements, the physical and functional configuration, and the documentation, particularly as changes are made. Configuration management is applied to the important features of nuclear and non-nuclear facilities, projects, operations, experiments, and activities commensurate with their relative importance to health, safety, environment, and mission.

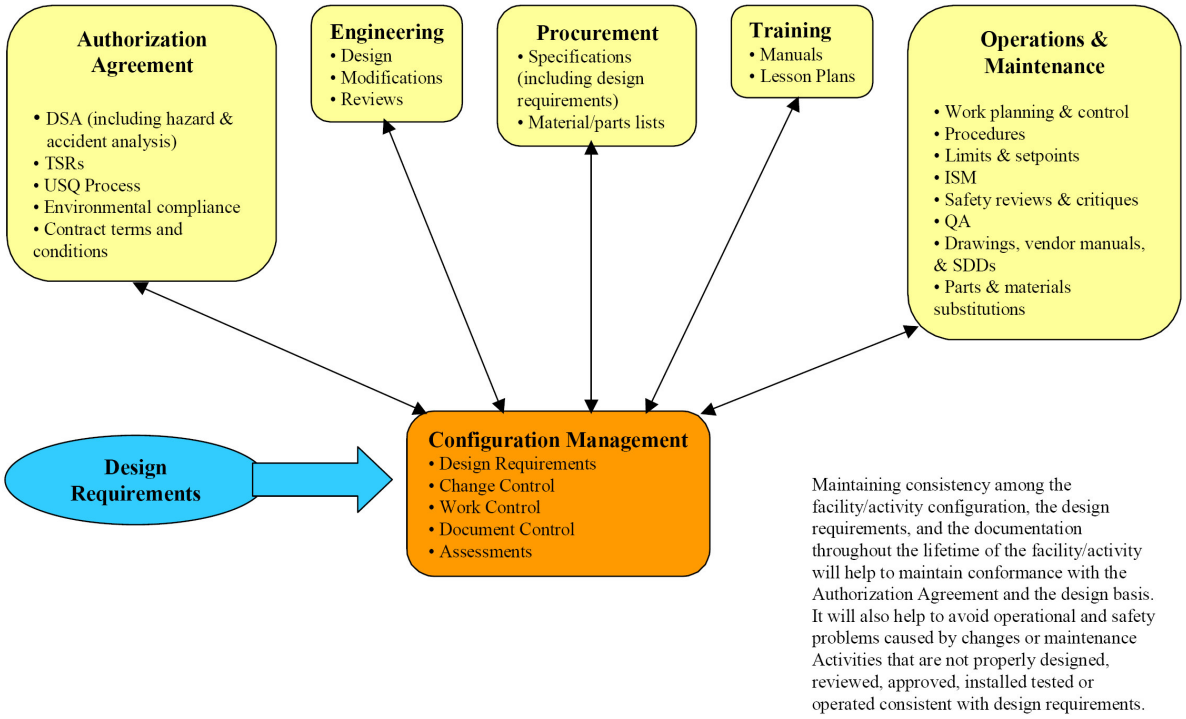
In addition to maintaining consistency among the design requirements, the physical configuration, and the documentation for the activity, the configuration management process must

- support the ISMS (reference DOE P 450.4, *Safety Management System Policy*; 48 CFR 970.5204-2, "Laws, Regulations, and DOE Orders"; and applicable DOE contracts);
- help to maintain the safety basis as required by subpart B of 10 CFR part 830;
- meet the quality assurance requirements for work processes and assessments in subpart A of 10 CFR part 830;

- meet the configuration management requirements of DOE O 420.1A, *Facility Safety*;
- meet the configuration management and work control requirements of DOE O 433.1, *Maintenance Management Program for DOE Nuclear Facilities*;
- support the requirement for documentation, traceability, and accountability for pressure vessels in DOE O 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*;
- ensure that changes to the design requirements, physical configuration, or documentation are reflected in procedures and training.

According to DOE-STD-1073-2003, *Configuration Management*, configuration management should be part of an integrated management scheme and not a separate, isolated effort.

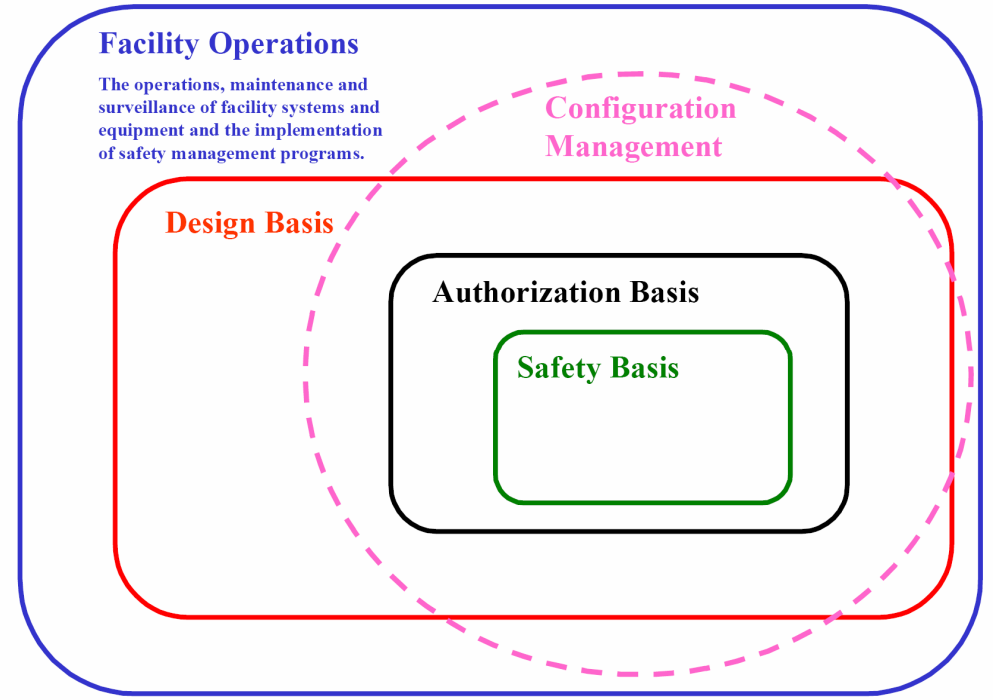
Configuration management supports a number of contractor organizations and initiatives by ensuring conformance with the established design requirements. The following figure illustrates some of these interfaces.



Source: DOE-STD-1073-2003

Configuration management interfaces

Proper application of the configuration management process should facilitate the contractor's efforts to maintain the safety and the authorization bases. This relationship is illustrated in the following diagram.



Source: DOE-STD-1073-2003

Relationship of configuration management to design, safety, and authorization bases

c. For the elements identified above, describe the possible effects on safe operations if they are ineffectively implemented.

Important features of the configuration management program are SSCs, computer hardware and software, communication networks, instructions and procedures, and designated physical or administrative items whose failure to satisfy requirements could lead to loss of life or health; noncompliance with laws, regulations, or orders; violations of safeguards or security requirements; or significant loss of production or research capability.

References: DOE-STD-1073-2003

d. Describe a typical configuration management process.

Configuration management should be consistent with the quantity, size, scope, and complexity of the project involved. Complex projects may require a highly organized configuration management system, while less complex projects may require nothing more than the control of the applicable technical specification. The configuration management process should be tailored to the specific project and to particular products. The selection of a facility, equipment, or other item for formal configuration management is determined by the need to control its inherent characteristics or to control its interface with other items. Initially, performance-oriented functional requirements should be used for configuration identification. Where appropriate, these requirements may be allocated to selected items that are part of a higher-level item. Finally, a detailed design should prescribe "build to" requirements and associated quality assurance provisions. This identification should be the basis for the preparation of technical, administrative, and management documents, (e.g.,

technical reports and spare parts) that concern or depend upon configuration. A permanent copy of the controlled identification documents should be maintained throughout the life cycle, beginning with the initial baseline documentation and including proposed and approved changes from those baselines. Configuration control must be exercised on a basis appropriate to the management level concerned and to the stage in the life cycle. All affected project activities, such as engineering, logistic support, quality assurance, maintenance, and procurement need to be involved in evaluating proposed changes in the configuration of an item throughout its life cycle. This would normally be accomplished through a configuration control board.

References: DOE-STD-1073-2003

e. Given the current version of DOE-STD-1073, or its successor, discuss the system engineer concept as it applies to oversight of safety systems. Specifically address the areas of configuration management, assessment of system status and performance, and technical support for operations and maintenance activities and for documented safety analysis reviews.

The configuration management program should identify and define key programmatic and organizational interfaces, beginning with the identification of a systems engineer. This position is tasked with integrating all the various elements of the program. Defining effective and efficient interfaces is critical to the workability of a configuration management program. Program interfaces are those relationships established to ensure that identification and integration of the essential facility programs effectively support and maintain consistency among the design requirements, documents, and hardware. Program interfaces include those internal to the configuration management program, such as the interface between document control and change control, and those between the configuration management program and programs such as design control, project control, maintenance (DOE O 433.1, *Maintenance Management Program for DOE Nuclear Facilities*), quality (DOE O 414.1B, *Quality Assurance*), and any program or mechanism involved in defining, evaluating, and documenting changes. As the fundamental approach to implementing the configuration management program is to identify, upgrade, and integrate these existing programs, the program management element should clearly identify these programmatic interfaces. Roles, responsibilities, and relationships among the program elements and functions should be defined and documented. Relationships to other programs that interface with the configuration program should also be clearly defined and documented.

f. Discuss each of the following elements of configuration management and how they contribute to safety and an effective configuration management program.
- **Program management;**
- **Document control;**
- **Change control;**
- **Graded approach;**
- **Design requirements; and**
- **Assessments.**

Program Management

The program management element of a configuration management program coordinates program development and implementation and ensures overall program effectiveness. This

element leads the development of the other CM program elements. Development of an effective CM program should be initiated promptly, where needed, to address known issues, to improve compliance with various DOE Orders, and to produce the benefits of improved safety, reduced errors, and increased efficiency. Configuration management program definition and development necessitates the establishment of local CM policy, philosophy, requirements, and strategies for development and implementation.

Configuration management program development activities should be performed in a phased manner and should include milestones. Initially, development activities should focus on preparation of CM program directives and plans. The CM program criteria indicate that the CM program plan should be provided to DOE for review within 18 months of initiation of planning. Development of the CM program elements begins after CM program plan concurrence and should be completed within 2 to 3 years. Program implementation should be initiated as each element is developed, with full implementation of the five CM program elements, including satisfactory post-implementation assessment, within 5 years. Adjunct programs such as design reconstitution could extend beyond 5 years. Once fully implemented, the CM program functions should be maintained throughout the life of the facility.

Document Control

The document control element ensures that documents are maintained current with the physical and functional configuration and the requirements. Documents may include paper copies (e.g., drawings, procedures, and manuals), electronic media (e.g., word processor files and computer databases), and photographic media (e.g., microfilm, microfiche, and photographs).

The document control process updates documents to reflect changes in a timely manner, distributes them appropriately, tracks documents, including change status, and maintains documents readily retrievable and available to personnel. Only the latest approved revisions of documents are used by personnel to perform work or make technical decisions. The types of documents included in CM are determined and document owners are established. The document owners are responsible for the technical content of the documents and for establishing priorities for revision and retrieval. Within each document type, the specific documents to be included in document control are identified for each SSC. The original or master copy of these documents is stored and protected. Retention times are established consistent with the needs of the document owners and the users.

Change Control

The change control element ensures that proposed changes are properly identified, reviewed, approved, implemented, validated (tested or inspected), and documented prior to use. The objective of the change control process is to ensure that proposed changes are consistent with the applicable requirements and are accurately reflected in associated documentation. To accomplish this, the mechanisms or work processes that can lead to temporary or permanent change are identified and controlled and integrated with the requirements and document control elements. Changes may include hardware changes, maintenance changes, process changes, operational changes, temporary modifications, document-only changes, and computer software changes. The change control process is performed in accordance with

approved procedures. For CM to be successful, unauthorized changes by any means must be prevented.

Proposed changes receive a technical review performed by qualified personnel to evaluate safety, environmental, and mission impacts; to verify appropriate post-implementation acceptance criteria; and to identify affected SSCs and associated documentation. Also, each change is reviewed to determine if it is within the bounds of the design requirements. Changes to design requirements are reviewed and approved by the design authority prior to implementation. Proposed changes are permitted only if found to be consistent with the approved requirements.

Prior to implementation, management reviews the proposed changes (including those that do not involve a change to design requirements) to verify that the technical reviews have been performed, that the change package is complete, and that any necessary external reviews have been obtained. When satisfied, management approves the change for implementation. The change control process includes mechanisms for field change requests. Technical reviews and approvals of field changes must be commensurate with the original change package.

Graded Approach

A graded approach means that the depth and rigor of detail necessary and the magnitude of resources to be invested are consistent with the quantity, size, scope, complexity, hazard involved, remaining facility or project life, and other considerations. (Improvements to existing CM processes are accomplished in phases with initial emphasis on health, safety, and the environment.)

Design Requirements

The requirements element identifies the functions and constraints (i.e., requirements) that must be satisfied to maintain the design basis or the safety basis, or achieve compliance with permits, laws, Orders, or regulations. Requirements are contained in the documents that define the physical, functional, operational, and performance capabilities/limits and characteristics of important features. Boundaries are established for the important features included in CM in such a manner as to contain the SSCs necessary to satisfy the requirements.

Assessments

The assessment element systematically evaluates the implementation of the other CM elements. Assessments examine, on an established frequency, the overall effectiveness of the CM programs and procedures (e.g., change control and document control) to determine if the control is adequate and appropriate. These assessments identify needed improvements or the need to increase or decrease the level of control. Physical configuration assessments, or walk downs, are performed for a representative sample of SSCs to determine the degree of agreement between the physical configuration, the requirements, and the associated documents. If substantial discrepancies are identified, then appropriate corrective action is taken.

This element also periodically monitors the important characteristics of SSCs included in CM to determine if they continue to be capable of meeting their design requirements. This

monitoring includes surveillance, periodic inspections and tests, and other actions taken to ensure safe and reliable operation in conjunction with maintenance activities. This monitoring considers measurements and trending of data related to aging degradation to prevent failure of the SSC from impacting operations and to ensure that design requirements continue to be satisfied throughout the life cycle of facilities, projects, operations, experiments, and activities.

References: DOE-STD-1073-2003

g. Discuss approved/recommended compensatory actions where inadequate configuration management exists and work is ongoing or to be initiated.

h. Using system drawings, walk down and assess the configuration management, operability, and reliability of a safety-class or safety-significant system in a facility with system engineer/safety system oversight (SSO) personnel.

Elements g and h are site-specific competencies. Check with your configuration management program for information to complete these elements.

14. An STSM shall have a working level knowledge of safeguards and security as related to safety practices.

a. Define the terms "safeguards" and "security" as they apply to the DOE Safeguards and Security Program.

As found in DOE M 470.4-7, "safeguards" is defined as

> An integrated system of physical protection, material accounting, and material control measures designed to deter, prevent, detect, and respond to unauthorized possession, use, or sabotage of nuclear materials.

"Security" is defined as

> An integrated system of activities, systems, programs, facilities, and policies for the protection of classified information and/or classified matter, unclassified controlled information, nuclear materials, nuclear weapons, nuclear weapon components, and/or the Department's and its contractors' facilities, property and equipment.

b. Discuss a Site Safeguards and Security Plan (SSSP), to include:
- **Content and purpose;**
- **Review/approval cycle;**
- **Design Basis Threat (DBT);**
- **Process (e.g., vulnerability assessments); and**
- **System effectiveness (P_E) reporting.**

DOE O 470.4, *Safeguards and Security Program*, details the site safeguards and security plan. The SSSP is a 5-year master planning document that must be prepared for sites with facilities meeting any of the following criteria:

- Category I quantities of SNM or credible roll-up quantities of SNM to a category I quantity
- Radiological, chemical, or biological sabotage threats
- Critical mission disruption threats
- Facilities the Secretary, Deputy Secretary, or Under Secretaries deem appropriate

The SSSP must depict the existing condition of site protection programs and, when the design basis threat performance standard cannot be met, establish improvement priorities and resource requirements for the necessary improvements.

The SSSP is a risk management document that provides summary information used to describe safeguards and security (S&S) programs and vulnerability and risk assessments at applicable sites. The results and conclusions contained in the plan are intended to guide long-term planning for site S&S operations. This is accomplished during plan development by identifying key site protection elements, by annually (at least every 12 months) evaluating site protection in terms of its adequacy to meet continued mission and threat parameters, and by identifying resource requirements.

The SSSP is used to evaluate site and facility program elements and resources as they relate to identified threats and risks. The protection measures identified in approved SSSPs become the basis for executing and reviewing site protection programs.

The SSSP describes the graded protection of DOE assets required to be implemented by line management. The SSSP identifies site risks, cost-benefit analyses, and comparison of proposed upgrades. The resource plan must identify near- and long-term resource requirements needed to ensure the integrity of existing and planned S&S upgrades. The annual review serves as the basis for tracking the implementation of protection measures and strategies necessary to maintain system effectiveness, and it identifies unfunded requirements.

The SSSP requires approval by DOE line management and concurrence by the cognizant head of the departmental element. Such approval authority must be formally delegated to line management.

- Copies of approved SSSPs must be provided to the Office of Security for review and comment.
- Other security plans may be approved as stipulated in the applicable directive. If approving authority is not otherwise stipulated, these security plans may be approved by DOE line management.

The SSSP must be submitted to DOE line management within 150 days of the termination date of data collection, and approved within 120 days of the submittal date. Directive changes, facility reconfiguration, a new vulnerability analysis (VA), or other activities that occur after the stated effective date will not be considered for purposes of reviewing/ approving the plan.

Updates to the SSSP that may significantly alter the agreed-upon protection philosophy or performance standards of protection systems must be subjected to the formal VA process,

and if changes are shown to significantly alter system effectiveness performance, the updates will be subject to the same concurrence and approval stated above.

An information copy of approved modifications must be provided to the Office of Security.

DOE O 470.3A, *Design Basis Threat (DBT) Policy*, must be used with local threat guidance during the conduct of VAs for protection and control program planning. The DBT must be the baseline threat definition, but local threat guidance may be used to increase the level of threat to be analyzed. Protection strategies must be implemented as specified in the DBT. The DBT must be used as the basis for planning protection programs.

The process of conducting a VA includes gathering data that describe the physical and operational characteristics of an S&S system, assigning values such as delay and detection, and analyzing the results to determine the relative effectiveness in conjunction with the adversary's capabilities as identified in the DBT and the Adversary Capabilities List.

The VA process consists of the following:

- Assumptions. Assumptions and scoping agreements must be defined. All assumptions must be documented in the VA report.
- Threat. The person responsible for the conduct of VAs must understand how the DBT relates to VAs.
- Targets. All security interests whose loss, theft, compromise, and/or unauthorized use will affect national security and/or the health and safety of DOE and contractor employees, the public, the environment, or DOE programs are potential targets.
- Modeling. Modeling is used to analyze S&S programs, interests, assets, and the effectiveness of program implementation. Modeling can include computer-based tools and simulations, table-top analyses, and subject matter expert analyses.
- Performance Testing. If conducted, the results of the following tests (including validation) must be considered in determining system effectiveness:
  - Force-on-force exercises
  - Limited scope performance tests
  - Alarm response and assessment performance tests
  - Breaching test data
  - Critical system element tests
- Results. The results of VAs indicate performance effectiveness. The VA results must be used for determining the following:
  - Protection system effectiveness reporting
  - S&S upgrades
  - Manning/armament levels for the protective force
  - Justifications for waivers of and exceptions to S&S policy
  - VA Practitioner Training. VA practitioners must successfully complete VA program training within 2 years of appointment.

The vulnerability assessment report documents the results of a VA. VARs must include targets analyzed, methodology used, system effectiveness results, parameters and assumptions under which the VA was conducted, and reference to evidence files.

S&S programs must be based on the results of vulnerability and risk assessments, the results of which are used to design and provide graded protection in accordance with an asset's importance or the impact of its loss, destruction, or misuse. The results of the assessments, to include the determination of system effectiveness, are one of the key considerations the manager must evaluate when establishing the level of risk.

System P_E methodology requires the determination of the probability of sensing, probability of assessment, and probability of detection at each layer. These are combined to determine the contribution to overall system effectiveness represented by each layer. Mathematically, this can be expressed as the equation:

$$P_{EL} = P_{IL} \times P_{NL} = P_{DL} \times P_{NL} = P_{AL} \times P_{SL} \times P_{NL}$$

where:

P_{EL}= the system effectiveness contribution for layer L.

P_{IL}= probability of interruption given first detection at layer L; $P_{IL} = P_{DL}$ if detection on layer L is timely, and is equal to 0 ($P_{IL} = 0$) if detection is not timely.

P_{DL}= probability of detection at layer L; $P_{DL} = P_{SL} \times P_{AL}$ on layer L. P_{DL} is the probability of first detection at layer L, given that detection has not occurred at an earlier layer, multiplied by the probability of sensing at an earlier layer, multiplied by the probability of sensing at layer L (P_{SL}) and the probability of assessment at layer L (P_{AL}).

P_{SL}= probability of sensing on layer L.

P_{AL}= probability of assessment on layer L.

P_{NL}= probability of neutralization given first detection at layer L.

L= the number of detection layers in the system before the critical detection point (CDP) in the adversary path(s). Detection after the CDP cannot be discounted.

P_E is defined as the system effectiveness of the layer. The system effectiveness of the layer is the product of the probability of interruption of the layer and the probability of neutralization given that detection occurred at that layer ($P_I \times P_N$). The probability of neutralization is determined discretely for each layer given detection at the layer. The neutralization determination is made if detection (regardless of the extent) takes place at the layer in question. Neutralization will occur sometime past the detection point and would be valid for the probability of neutralization of that specific layer.

P_D of the layer is defined as the product of the probability of sensing and the probability of assessment of the layer ($P_S \times P_A$). Note that detection and assessment will be different between the elements of the layer and between layers.

P_{IL} of the layer is defined as $P_{IL} = P_{DL}$ if detection on layer L is timely, and equal to 0 ($P_{IL} = 0$) if detection is not timely.

For those protection systems based on sensing, assessment, detection, interruption, and active neutralization of an adversary, credit can only be taken up to the "point on the pathway" at which the total of the adversary task time, engagement times, and delay times exceeds the protective force response times. This limiting criterion eliminates credit being taken for protection system capabilities that are not engaged prior to the adversary completing their objective. For denial-based protection systems, the point on the pathway is the critical detection point. The critical detection point is defined as the point at which the protective force must have timely detection, assessment, and response to initiate a response to have a high probability of success in the neutralization of the adversary or denial of the adversary's task/objective. Therefore, for a facility employing multiple, complementary layers of protection, the representative total protection system effectiveness is calculated up to the point at which the protection systems can still effectively engage an adversary prior to completion of the objective.

The contributions of each layer along the adversary pathway are then combined to determine the overall system effectiveness, where the overall system effectiveness is provided by the sum of the contributions of each layer (only those encountered along the adversary pathway) to the system effectiveness.

References: DOE M 470.4-1

c. Discuss in detail the purpose, interrelationship, responsibilities and basic requirements for the following:
- **Physical security;**
- **Personnel security; and**
- **Material control and accountability (MC&A).**

Physical Security

The implementation of graded physical protection programs must be documented. Site physical protection programs must be systematically planned, executed, evaluated, and documented as described by an SSSP or site security plan (SSP). Physical protection programs must be based on DOE O 470.3A, *Design Basis Threat Policy* (see DOE M 470.4-1, *Safeguards and Security Program Planning and Management*) and used in conjunction with local threat guidance.

In locations where an SSSP is not required due to the limited scope of safeguards and security interests, an SSP must be developed to describe the protection program.

Departmental assets must be protected from malevolent acts such as theft, diversion, and sabotage and events such as natural disasters and civil disorder by considering site and regional threats, protection planning strategies, and protection measures. SNM must be protected at the higher level when credible roll-up to category I quantities can occur within a single security area unless the facility has conducted a vulnerability assessment that determined the failure or defeat of protection measures would not decrease system effectiveness. The Department has the authority to impose requirements deemed necessary to protect the safety of employees and the public and to minimize threats to life, SNM, radiological/chemical/biological materials, classified information or matter, Government property, the public, and the environment.

Sites upgrading security measures must consider the benefits provided by security technology by conducting a life-cycle cost-benefit analysis comparing the effectiveness of security technology to traditional manpower-based methodologies. However, at category I and category II facilities, security technology must be used, to the greatest extent possible, to allow protective force personnel to concentrate on the primary mission of protecting nuclear weapons, SNM, and designated high-value targets.

Personnel Security

Personnel security requirements are developed to

- ensure that individuals are processed for, granted, and retain a DOE access authorization only when their official duties require such access;
- allow access to DOE classified matter and SNM only when it has been determined that such access will not endanger the common defense and security and is clearly consistent with the national interest;
- maintain the numbers and types of access authorizations at the minimum levels necessary to ensure the operational efficiency of DOE classified and SNM programs and operations;
- conduct personnel security activities in a manner that ensures the
  - timely and efficient processing of initial access authorization requests and reinvestigations;
  - consistent, objective, and fair interpretation and application of criteria and procedures in every access authorization action;
  - timely review and adjudication of investigative reports and other information related to an individual's access authorization eligibility; and
  - maintenance of accurate, complete, and timely access authorization file and record information, the availability of such information to authorized users, and the protection of such information against unauthorized disclosure;
- periodically evaluate individuals retaining access authorizations to confirm their continued need for access and access authorization eligibility;
- ensure that DOE employees, contractors, and others involved in personnel security activities effectively and efficiently execute their personnel security-related responsibilities and authorities;
- prevent the use of personnel security activities for reprisal, discrimination, or any other unauthorized purpose; and
- promote proactive participation in personnel security activities at the international, national, and inter-agency levels to ensure the adequate expression and consideration of DOE mission and program interests.

DOE M 470.4-5, *Personnel Security,* contains these and other requirements.

MC&A

General requirements for material control and accountability are as follows:

- SNM must not be received, processed, or stored at a facility until facility approval has been granted in accordance with the requirements of DOE O 470.4, *Safeguards and Security Program.*
- Facilities must control and account for nuclear materials as required. Field elements must implement an MC&A program using requirements contained in DOE M 474.1-

1B, *Manual for Control and Accountability of Nuclear Materials*, as the minimum for nuclear materials. The level of control and accountability must be graded according to the economic and strategic value of these materials and the consequences of their loss.

- Each facility must designate a management official responsible for MC&A. This official must be organizationally independent from responsibility for other programs. Each facility or site that has a reporting identification symbol must designate a nuclear materials representative who will be responsible for nuclear materials reporting and data submission to the Nuclear Materials Management and Safeguards System (NMMSS). The NMMSS is used to accumulate and distribute information concerning nuclear material transactions and inventories. The objective of the system is to report accurate and complete data as soon as possible after the events described by the data occur. The national database must provide nuclear material information relating to safeguards, material management and production, inventory quantities and valuations, and other programs requested or required by DOE or the NRC.
- Each facility must maintain documentation that defines authorities and responsibilities for MC&A functions (e.g., accounting system, measurements, measurement control, inventories, audit, material access controls, and surveillance). Each facility must have a program to ensure that personnel performing MC&A functions are trained and qualified to perform their duties and responsibilities and are knowledgeable of requirements and procedures related to their functions.
- Each facility possessing nuclear materials must develop an MC&A plan that specifies review frequency and change control and that is approved.

This is only a partial list of the requirements for MC&A. A complete list, along with associated tables and figures, is available in DOE M 474.1-1B.

The interrelationship of these programs is the underlying concept of the protection of departmental assets, both tangible and intangible.

d. Describe the use of information security systems within DOE.

The information security system is used to help ensure that sensitive information is protected from compromise and secured against unauthorized disclosure. The system is structured to provide management with the necessary information required for sound risk management decisions concerning the protection of sensitive information.

References: DOE M 470.4-4

e. Discuss the interrelationship between safeguards and security to safety practices and facility operations.

Persons performing safeguards and security functions at DOE facilities often perform inherently hazardous activities or are exposed to hazardous conditions. For example, protective force personnel perform a variety of duties (e.g., patrolling at night and under adverse weather conditions, responding to alarms, and enforcing security requirements) that can involve the use of force, including deadly force, for protecting strategic quantities of SNM. Further, security personnel must perform activities in areas where radioactive materials and/or hazardous chemicals are used and stored.

DOE M 470.4-1, *Safeguards and Security Program Planning and Management*, states that S&S interests and activities must be protected from theft, diversion, terrorist attack, industrial sabotage, radiological sabotage, chemical sabotage, biological sabotage, espionage, unauthorized access, compromise, and other acts that may have an adverse impact on national security or the environment, or that may pose significant danger to the health and safety of DOE Federal and contractor employees or the public.

A principal objective of the integrated safeguards and security management program is to integrate S&S into management and work practices at all levels, based on program line management's risk-management-based decisions, so that missions may be accomplished without security events. Mechanisms must also exist to assure that S&S program planning is fully integrated with overall site strategic and near-term operational planning.

Actions must be taken to ensure an acceptable S&S program, including curtailment or suspension of operations when such operations would result in an immediate and unacceptable impact to national security, the environment, or the health and safety of the public or employees.

DOE M 470.4-2, *Physical Protection*, states that S&S programs must meet mission objectives and the DOE safety and health objectives to protect workers, which are detailed in DOE M 411.1-1C, *Safety Management Functions, Responsibilities, and Authorities Manual.*

DOE O 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*, states that DOE elements must establish firearms safety policies and procedures to ensure proper accident prevention controls are in place. Written procedures should address safety concerns and personal protective equipment requirements. DOE O 440.1A also establishes the minimum areas that must be addressed by the procedures.

Staff members responsible for the direction and operation of the firearms safety program will be professionally qualified and have sufficient time and authority to implement the established program. The program must be assessed for implementation of procedures, personnel responsibilities, and duty assignments to ensure overall policy objectives and performance criteria are being met by qualified safety personnel.

DOE elements will implement provisions related to firearms safety training, qualification, or requalification. DOE elements will also ensure that the transportation, handling, placarding, and storage of munitions conform to the applicable requirements of DOE M 440.1-1A, *DOE Explosives Safety Manual*. DOE-STD-1091-96, *Firearms Safety*, provides guidance on the development, implementation, and maintenance of a comprehensive firearms safety program to achieve the policy objectives and fulfill the requirements in DOE O 440.1A.

The safeguards and security measures employed by DOE are in constant flux. New threats emerge at an ever-increasing frequency and must be countered with equally sophisticated barriers. Modern technology provides a dynamic environment through which threats and effective countermeasures interact. This challenge continues to evolve as new technologies are developed. The interrelationship between these programs allows for a balanced accomplishment of departmental activities.

f. Discuss the security requirements associated with the Department's foreign visitor and assignments program.

All unclassified visits (30 days or less) and assignments (more than 30 days) of foreign nationals will be managed consistent with DOE and national security policy and requirements, including DOE O 142.3. Classified visits are governed by DOE O 142.1. The general security requirements for both are discussed below.

All DOE organizations that sponsor unclassified foreign national visits and assignments will maintain a reporting and record-keeping system. The reporting system will be an integral part of the approval process, and reporting information will be provided to DOE HQ to support the departmental information needs. At a minimum, the following information on each foreign visitor and assignee will be reported:

- Biographical and personal information, including date and place of birth, permanent address, and place/nature of employment
- Passport, visa, and immigration and naturalization service information; purpose for the visit or assignment, including detailed information on the research to be performed
- Actual dates, subjects, and areas to be visited and those areas actually visited
- Need for an export license, if applicable
- Information related to required indices checks
- Information related to the appropriate security plan (generic or specific)
- Identity of the host of the visit or assignment
- Identity of the sponsoring organization of the visit or assignment

Additional information will be required for all visits or assignments that require access to a security area by a foreign national, access to a sensitive subject by a foreign national, or access to any DOE facility or site by a foreign national from a sensitive country. This additional information must clearly indicate the results of coordination with counterintelligence, foreign intelligence, export control, and security organizations. Counterintelligence organizations will maintain the responsibility for indices checks, export control organizations will maintain responsibility for sensitive subject reviews and transfer authorization, and security organizations will ensure development of plans for the protection of security interests. The additional information will be provided to DOE HQ to support departmental information needs.

Approval authority for all unclassified foreign visits and assignments at DOE field and contractor sites (including DOE laboratories) will be delegated to the site manager/laboratory director. Approval authority for unclassified visits and assignments at DOE HQ will be assigned to the Secretarial Officer from the sponsoring organization. Approving officials will be accountable for all approval decisions and for implementing an approval process. Each DOE and DOE contractor organization must have an approval process that includes appropriate input from officials with responsibility for counterintelligence, security, export control, and technology transfer. These processes must address requirements for indices checks and security plans, if required, and will provide for follow-up contact by facility counterintelligence officials. These processes will also ensure

- That instances of close and continuing contact with foreign visitors and assignees from sensitive countries on or off DOE sites are referred to the facility counterintelligence officials.
- Compliance with the export control guidelines established by the Office on Non-proliferation and National Security. All visits and assignments by foreign nationals from countries on the list of state sponsors of terrorism maintained by the Department of State are to be approved by the Secretary.

Indices checks are required for all visits and assignments of foreign nationals that are citizens of, or are employed by a government or institution of, a sensitive country, and for all visits and assignments of foreign nationals involving security areas or sensitive subjects. Indices checks will be completed by the Office of Counterintelligence. Indices checks will not be required for visits to designated DOE officials by foreign national diplomats and other foreign national senior Government officials for the primary purpose of high-level policy dialogue. The Secretary will designate these DOE officials.

A minimum of 30 days advance notice will be required for indices checks on visitors and assignees. The results of indices checks will be used in the review and approval process by the host organization.

Indices checks must be completed prior to the visit or assignment. When circumstances do not allow for timely submission or completion of an indices check, the approving official must consult with the appropriate counterintelligence official prior to making an approval decision.

Security plans are required for all unclassified foreign visits and assignments to security areas. Specific security plans tailored for individual foreign visits or assignments should be developed and approved by the site manager/laboratory director for all visits or assignments that require access to a security area, access to a sensitive subject, or access to any DOE facility or site by a foreign national from a sensitive country. When access to a security area or a sensitive subject is not required, generic security plans will be developed. Generic security plans should ensure that security interests and sensitive information and technologies are not placed at risk as a result of hosting foreign visitors and assignees. Security plans should be reviewed by the cognizant DOE field or HQ security organization (depending on where the visitor or assignee is going) and approved by the unclassified foreign visits and assignments approval authority prior to the commencement of the visit or assignment.

The Office of Nonproliferation and National Security will maintain and distribute a current list of sensitive countries that will be updated annually based on input from the appropriate DOE organizations. This list may be supplemented by the Secretary of Energy to include additional countries posing significant national economic security concerns. Approving officials are responsible for managing approvals according to the current list. The Office of Nonproliferation and National Security will maintain and distribute a current list of sensitive subjects. This list will be reviewed at least every 6 months based on input from appropriate DOE organizations. DOE facilities may append lists of their own, comprising proprietary information. These lists should be developed with input from facility officials with responsibility for counterintelligence, export control, foreign intelligence, and national

security, and are to be submitted to the Office of Nonproliferation and National Security and the Office of Counterintelligence.

The Office of Foreign Visits and Assignments Policy, in coordination with the Office of Counterintelligence, will manage a central tracking system for visits and assignments to DOE facilities and establish required reporting formats.

Line management is responsible for implementation of the unclassified foreign visits and assignments process. Program reviews should be conducted periodically by the Office of Foreign Visits and Assignments Policy and the Office of Counterintelligence to assess policy effectiveness and to identify improvement areas. Independent oversight of the overall performance of the Foreign Visits and Assignments Program is the responsibility of the Office of Independent Oversight and Performance Assurance.

g. Participate in an audit of safeguards and security practices at a given facility or site.

Note: This element is performance based. The Qualifying Official will evaluate its completion.

15. An STSM shall have a working level knowledge of the DOE directives structure and their relationship to applicable laws, rules, Federal/state regulations, and industry standards.

a. Demonstrate an understanding of the purpose and the relationship between DOE Orders, directives, Federal regulations, and State regulations.

Department of Energy directives are documents that include Policies, Orders, Notices, Manuals, Guides, regulations, technical standards, and related documents. This program is managed under DOE O 251.1B, and templates are available electronically in DOE M 251.1-1B.

Policies are established through the Office of the Secretary and reflect the philosophies and fundamental values of the Department. They do not contain requirements; however, Orders, Notices, and Manuals may flow from Policies and must be consistent with them.

Orders establish (1) management objectives, requirements, and assignment of responsibilities for Federal employees; (2) intended requirements for contractors; and (3) requirements unique to DOE and avoid duplicating information from other directives or any existing legal source. They also convey requirements necessary to perform a job or requirements in a specific subject matter area.

Like Orders, Notices establish requirements and assign responsibilities for DOE employees and contractors (through a CRD). Notices are also used to communicate general information throughout the Department.

Unlike Orders, however, Notices are issued for immediate or short-term use and expire no later than 1 year from issuance (and can be granted 1-year extensions). Unless an exception

has been negotiated with the Office of Management Communications, Notices must include objectives, cancellations, applicability, requirements, responsibilities, and contact paragraphs. Notices that extend other directives beyond their expiration dates are often issued in abbreviated form.

Manuals supplement other directives, laws, regulations, or requirements by providing more instructions or details on how the provisions of those directives or laws must be carried out throughout DOE. Manuals identify procedural requirements in more detail than Orders for DOE Federal employees and intended requirements for contractors, which must be in the form of a CRD attached to the Manual.

Guides provide preferred, non-mandatory, supplemental information about acceptable methods for implementing requirements, including lessons learned, suggested practices, instructions, and suggested performance measure. They do not impose requirements but may quote requirements if the sources are adequately cited, and they provide alternate methods that may be used if it can be demonstrated that they provide an equivalent or better level of performance.

Regulations establish enforceable requirements pursuant to the Department's authority under law and in accordance with the Administrative Procedure Act. Their development is managed by the Office of General Counsel.

Technical standards and related documents are non-mandatory criteria managed under the Technical Standards Program. Standards provide possible methodologies and criteria for meeting requirements and can be made mandatory under DOE regulatory or contractual provisions. Technical standards are not processed through the Directives Program.

The relationship between DOE directives and Federal and state regulations is based, in part, on the fact that directives are not regulatory in nature, but rather are mechanisms through which regulations are implemented and enforced. Directives provide requirements and guidance to achieve those requirements, but are not enforcement mandates. Additionally, the requirements under Federal and state regulations are mandatory, and may be equal to or more strict that those found in directives, but not less. State and local regulations are generally applied through local procedures.

b. Discuss the DOE directives process.

The steps listed below must be followed for each new Order or major revision:

- The office of primary interest should identify the need for a directive. This may result from new legislation or regulation, a change or development in departmental policy, a change in technology, lessons learned, etc.
- The head of the office of primary interest should appoint a directive development manager, who should determine the type of directive that is appropriate as well as the departmental elements and contractors to participate in development of the directive.
- The directive development manager and directives system manager should develop a schedule for completion of major tasks, for example, preparation of the directives management document (DMD) and the draft directive; review of each by departmental elements and contractors; preparation of cost impact estimates (if

required), resolution of comments; and preparation, approval, and distribution of the final directive.

- The directive development manager should develop the DMD for a new or revised Order. The DMD should then be submitted to the directives system manager for editorial review in advance of coordination. Any changes made as a result of this review must have the concurrence of the office of primary interest.
- Departmental elements and contractors should review the DMD to identify significant issues, comment on the need for and feasibility of implementing the proposed directive, suggest alternate approaches, and comment on the preliminary cost documentation.
- The office of primary interest should provide preliminary cost documentation on the DMD for each Order, with new, modified, or canceled requirements. This documentation should contain the following:
  - Any assumptions, cost drivers, cost methodology, or identification of requirement changes.
  - A description of assumptions and rationale for no additional costs or insignificant costs on the DMD, which also constitutes a cost estimate. If no objections are raised during coordination of the DMD, no further action is required.
- The directive development manager, with editorial assistance provided by the directives system manager, should prepare a draft directive and the initial cost impact estimate using input generated by the DMD. The directive development manager should solicit participation in development of these documents from departmental elements and contractors where appropriate.
- The directives system manager's editorial review, conducted in cooperation with appropriate departmental elements (general counsel, program offices, etc.), should include examining the document organization and internal consistency, determining its compatibility with other directives and external regulations, and ensuring that its provisions are clearly and succinctly stated. Prior to coordination, the directive development manager from the office of primary interest will review and agree upon changes made as a result of the editorial review. It should then be distributed to departmental elements and contractors for review.
- Departmental elements and contractors should review the draft directive and provide comments to the office of primary interest, which should prepare the final draft for approval and provide feedback to the reviewers.
- The office of primary interest is responsible for identifying requirements added, deleted, or modified by any new or revised Order. This information will be issued along with the final directive to help implementing organizations understand the impact of the directive. For directives of interest to the DNFSB, this information should be presented as a crosswalk showing the disposition of existing requirements.

References: DOE M 251.1B

c. Demonstrate an understanding of the DOE rulemaking process.

One of the primary duties of DOE is to establish regulations on the safe use of nuclear materials. These regulations are developed in collaboration with the NRC. The regulations address such issues as siting, design, construction, operation, and ultimate shutdown of nuclear power plants, uranium mills, fuel facilities, waste repositories, and transportation

systems. The regulations also address other uses of nuclear materials, such as nuclear medicine programs at hospitals, academic activities, research work, industrial applications such as the use of gauges and testing equipment, and the import and export of nuclear materials and technologies. The process of developing these regulations is called rulemaking. A regulation is sometimes referred to as a rule. Rulemaking is initiated mostly by the NRC's technical staff, although any member of the public may petition the NRC to develop, change, or rescind any regulation.

Most rulemakings provide the public with at least one opportunity for comment in a process found in 5 U.S.C., § 553. Often, there are several opportunities. In some cases, NRC and/or DOE holds meetings and workshops before a proposed rule is drafted. This way, members of the public can express their concerns early in the process and identify important issues to be covered in the rule. Sometimes, the NRC publishes an advance notice of proposed rulemaking in the Federal Register Main Page, at http://www.gpoaccess.gov/fr/index.html, to present options, questions, and ideas, and the public is asked to comment on these options or present options of their own. An advance notice does not include a preferred approach for which comments are being solicited. After the public comment period is over, a decision is made whether or not to continue with the rulemaking and if so, what form it will take. The NRC may issue an emergency rule or a minor administrative rule without seeking public comment.

When a proposed rule is developed, it is published in the *Federal Register* for public comment. The notice identifies a contact who can reply to questions and an address to which comments can be sent. The Department may hold meetings and workshops to discuss the proposed rule, explain its purpose and background, and receive further comments. These meetings are normally announced in the *Federal Register*.

d. Demonstrate an understanding of the relationship between the DOE and OSHA and EPA.

The Atomic Energy Act of 1954 gave responsibility for worker safety to the Atomic Energy Commission. When OSHA was established, under the Department of Labor in 1971, the statutory authority for DOE facilities was excluded from the purview of that Act. However, through a 1992 memorandum of understanding, the applicable OSHA standards were agreed to be applied at DOE facilities, including those operated by contractors. However, the primary responsibility for worker safety still resides with DOE, under DOE O 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees.*

Regarding the EPA, again the AEA of 1954 provided exemption from the requirements when the EPA was formed. However, subsequent legislation, namely the Federal Facilities Compliance Act of 1992, required DOE to apply EPA environmental standards at all DOE sites, including contractor-operated facilities. The enforcement of those standards resides with DOE, as applied under DOE O 450.1, and includes the ability to fine contractors for non-compliance, under 10 CFR 851.

e. Demonstrate an understanding of the purpose of the FFCA.

The Federal Facilities Compliance Act of 1992 establishes that Federal facilities do not have sovereign immunity from state enforcement of state environmental laws under the solid and hazardous waste provisions of the SDWA. Thus, Federal facilities are obligated to pay fines and penalties assessed by states. Additionally, provisions of the Act give EPA broader enforcement authority at Federal facilities. The Act created a new mixed-waste provision requiring reports on the national inventory of all mixed waste on a state-by-state basis and on the nation's inventory on mixed-waste treatment capacities and technologies.

References: P.L. 102-386, October 6, 1992

f. Discuss the use of memoranda of understanding (MOU) and memoranda of agreement (MOA) with external agencies and organizations.

As defined in now-canceled DOE Order 1280.1A,

> A memorandum of understanding (MOU) is a written agreement broadly stating basic understandings of tasks and describing a method for performing these tasks between the Department and other signatory authorities which include: other Federal agencies; local, State, international, tribal, or other Government entities; the private sector; and educational institutions. An MOU is not a binding contract. It cannot be used to obligate or commit funds or as the basis for the transfer of funds. Agreements within DOE between Departmental Elements are not considered MOUs for purposes of this Order (a Memorandum of Agreement can be used between/among DOE Elements).

Examples of use of memoranda include funds-out interagency agreements, which provides guidance on the use of funds-out interagency agreements for obtaining materials and services to be provided by other Federal agencies to DOE, and assignment of departmental personnel outside the department, which permits assignment of DOE employees to non-DOE activities and organizations when this furthers the interests of the Department or the Federal Government.

g. Discuss the purpose and scope of standards/requirements identification documents (S/RIDs), Work Smart Standards and directive flowdown and their relationship to contract list A and list B.

S/RIDs

An S/RID contains the standards/requirements that are necessary and sufficient to provide an adequate level of protection of workers, the public, and the environment. The determination of selected standards is to be tailored to the work to be performed. Judgments related to inclusion of requirements in S/RIDs will be based on the hazards present at the site, facility, or activity.

The implementation of requirements involves two phases: first, the requirements must be fully applied in the implementing documents of the site, facility, or activity (e.g., policies, procedures, engineering drawings, training materials, safety analysis reports, etc.); second, the actions and conditions at the site, facility, or activity must be consistent with the

specifications in the implementing documents. The assessment activities related to the two phases are very different, and, therefore, separate approaches are required for their performance. Phase I assessments involve the review and evaluation of the implementing documents to determine whether they specify the actions and conditions necessary for compliance with each requirement. Phase 2 assessments involve the review of activities and conditions to determine whether they adhere to the implementing documents. Assessments must include both phases to ensure compliance.

List A in a DOE contract contains the laws and regulations that are applicable to the contract. Contractors operating under 48 CFR 970.5204-78 or 48 CFR 970.5204-2 (whichever version is in the contract) have a contract appendix that includes a list of applicable directives (referred to as List B in the DEAR clause). List B is updated on a quarterly basis by the issuance of a contract modification which includes the approved requirements change notice. This list describes the operating requirements with which the contractor must comply. The requirements related to ES&H compliance are included by number and/or reference to an S/RID. Title 48 CFR 970.0470-1(c) requires that ES&H requirements be consistent with the requirements document process (S/RID or WSS, discussed below).

Work Smart Standards (WSS)

WSS are sets of environment, safety, and health laws, regulations, and other standards that have been specifically chosen for applicability and appropriateness for a particular scope of work. They are selected to provide adequate protection (when properly implemented) against the hazards associated with that work. WSS sets were previously known as Necessary and Sufficient Sets of standards prior to the name change directed by the Secretary of Energy in April 1996.

WSS sets are developed using a DOE-authorized closure process. This process is described in DOE M 450.3-1, *The Department of Energy Closure Process for Necessary and Sufficient Sets of Standards*. Use of the process is authorized in DOE P 450.3, *Authorizing Use of the Necessary and Sufficient Process for Standards-Based Environment, Safety, and Health Management.*

The primary objective of the closure process is the identification of a set of standards that, when implemented, will provide reasonable assurance that the environment and the safety and health of the workers and the public will be protected during the performance of work. All applicable requirements of law and regulation are included in the WSS set (even if accidentally omitted from the formal list).

The closure process relies on expert judgment of a team of people familiar with the work and with ES&H controls and programs. DOE and contractor line management, ES&H professionals, and outside stakeholders, such as the public and regulators, all have the opportunity to provide input to the process. The process promotes re-examination of missions, activities, work operations, and work controls to ensure that work is carried out efficiently in a safe, responsible, and cost-efficient manner.

h. Demonstrate an understanding of Public Law 104-113 regarding the use of industry consensus standards.

On March 7, 1996, President Clinton signed into law the National Technology Transfer and Advancement Act of 1995. The new law, referred to as P.L. 104-113, serves to continue the policy changes initiated in the 1980s under OMB Circular A-119, *Federal Participation in the Development and Use of Voluntary Standards*, that are transitioning the executive branch of the Federal Government from a developer of internal standards to a customer of external standards. Section 12, "Standards Conformity," of the act states that ". . . all Federal agencies and departments should use technical standards that are developed and adopted by voluntary consensus standards bodies, using such technical standards as a means to carry out policy objectives or activities determined by the agencies and departments." The act further states that ". . . Federal agencies and departments should consult with voluntary, private sector, consensus standards bodies, and should participate with such bodies in the development of technical standards." The act defines technical standards as "performance-based or design-specific technical specifications and related management systems practices."

i. Demonstrate an understanding of the purpose of the Federal Advisory Committee Act (FACA).

Congress passed the Federal Advisory Committee Act, 5 U.S.C. appendix 2, in 1972. Its purpose is to ensure that advice rendered to the executive branch by the various advisory committees, task forces, boards, and commissions formed over the years by Congress and the president, be both objective and accessible to the public. The Act not only formalized a process for establishing, operating, overseeing, and terminating these advisory bodies, but also created the Committee Management Secretariat, an organization whose task is to monitor and report executive branch compliance with the Act.

The FACA database is used by Federal agencies to continuously manage an average of 1,000 advisory committees Government-wide. This database is also used by Congress to perform oversight of related executive branch programs and by the public, the media, and others to stay abreast of important developments resulting from advisory committee activities.

References: P.L. 92-463, 1972

16. An STSM shall have a working level knowledge of the Price-Anderson Amendments Act of 1988 (PAAA) and its impact on DOE nuclear safety activities.

a. Demonstrate an understanding of the PAAA.

The 1988 PAAA is an amendment to its predecessor, the 1957 Price-Anderson Act, which ended the governmental monopoly on nuclear power generation, permitted by the Atomic Energy Amendments Act of 1954. PAAA continues the indemnification of DOE contractors from costs related to public liability for nuclear-related accidents. It differs from the original Act in two principal ways:

1. It made Price-Anderson coverage mandatory for all M&O contractors, subcontractors and suppliers conducting nuclear activities for DOE. (For the purposes of the statute, "nuclear" includes "radiological.")

2. Congress mandated that DOE change its methods of managing nuclear activities at contractor-operated sites by requiring DOE to undertake enforcement actions against indemnified contractors for violations of nuclear safety requirements. The establishment of enforcement sanctions as a method of ensuring compliance with safety requirements is intended to minimize the risk to workers and the public.

In the case of most DOE activities, the system of financial protection currently takes the form of an indemnification by DOE for legal liability for a nuclear incident or a precautionary evacuation arising from activity under a DOE contract. The DOE Price-Anderson indemnification

- provides omnibus coverage of all persons who might be legally liable for injuries related to a nuclear incident;
- indemnifies fully all legal liability up to the statutory limit on such liability (currently approximately $8.96 billion for a nuclear incident in the U.S.);
- covers all DOE contractual activity that might result in a nuclear incident in the U.S.;
- is not subject to the availability of funds; and
- is mandatory and exclusive.

References: 10 CFR 820

b. Demonstrate an understanding of the Act's applicability to the Department's nuclear safety activities, and specifically to each of the site's facilities and major activities.

Title 10 CFR 851 states that if the Under Secretary approves a variance, the Under Secretary must notify the Assistant Secretary for Environment, Safety, and Health, who must notify the Office of Price-Anderson Enforcement and the cognizant Secretarial Officer, who must promptly notify the contractor.

Title 10 CFR 851 sets forth the general framework through which DOE will seek to ensure compliance with its worker safety and health regulations, and, in particular, exercise the civil penalty authority provided to DOE in section 3173 of P. L. 107–314, Bob Stump National Defense Authorization Act for Fiscal Year 2003 (December 2, 2002) (NDAA), amending the AEA to add section 234C. The policy in 10 CFR 851 is applicable to violations of safety and health regulations in this part by DOE contractors, including DOE contractors who are indemnified under the Price-Anderson Act, 42 U.S.C. 2210(d), and their subcontractors and suppliers.

The Department of Energy Organization Act, 42 U.S.C. 7101–7385, the Energy Reorganization Act of 1974, 42 U.S.C. 5801–5911, and the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2011, require DOE to protect the public safety and health, as well as the safety and health of workers at DOE facilities, in conducting its activities, and grant DOE broad authority to achieve this goal. Section 234C of the AEA makes DOE contractors (and their subcontractors and suppliers) covered by the DOE Price-Anderson indemnification system, subject to civil penalties for violations of the worker safety and health requirements promulgated in this part.

DOE may assess civil penalties of up to $70,000 per violation per day on contractors (and their subcontractors and suppliers) that are indemnified by the Price-Anderson Act, 42 U.S.C. 2210(d). For additional information, see 10 CFR 851.5(a).

The purpose of the DOE enforcement program, described in 10 CFR 851, is to promote and protect the safety and health of workers at DOE facilities by

- ensuring compliance by DOE contractors with the regulations in 10 CFR 851;
- providing positive incentives for DOE contractors based on
  - timely self-identification of worker safety noncompliances;
  - prompt and complete reporting of such noncompliances to DOE;
  - prompt correction of safety noncompliances in a manner that precludes recurrence;
  - identification of modifications in practices or facilities that can improve worker safety and health;
- deterring future violations of DOE requirements by a DOE contractor; and
- encouraging the continuous overall improvement of operations at DOE facilities.

Documented Safety Analyses

The contractor responsible for a hazard category 1, 2, or 3 DOE nuclear facility must obtain approval from DOE for the methodology used to prepare the DSA for the facility unless the contractor uses a pre-approved methodology.

The DSA for a hazard category 1, 2, or 3 DOE nuclear facility must, as appropriate for the complexities and hazards associated with the facility,

- describe the facility, including the design of safety structures, systems, and components and the work to be performed;
- provide a systematic identification of natural and man-made hazards associated with the facility;
- evaluate normal, abnormal, and accident conditions, including consideration of natural and man-made external events, identification of energy sources or processes that might contribute to the generation or uncontrolled release of radioactive and other hazardous materials, and consideration of the need for analysis of accidents which may be beyond the design basis of the facility;
- derive the hazard controls necessary to ensure adequate protection of workers, the public, and the environment, demonstrate the adequacy of these controls to eliminate, limit, or mitigate identified hazards, and define the process for maintaining the hazard controls current at all times and controlling their use;
- define the characteristics of the safety management programs necessary to ensure the safe operation of the facility, including (where applicable) quality assurance, procedures, maintenance, personnel training, conduct of operations, emergency preparedness, fire protection, waste management, and radiation protection; and
- with respect to a nonreactor nuclear facility with fissionable material in a form and amount sufficient to pose a potential for criticality, define a criticality safety program that
  - ensures that operations with fissionable material remain sub-critical under all normal and credible abnormal conditions,

- identifies applicable nuclear criticality safety standards, and
- describes how the program meets applicable nuclear criticality safety standards.

Unreviewed Safety Questions

The contractor responsible for a hazard category 1, 2, or 3 DOE nuclear facility must establish, implement, and take actions consistent with a USQ process.

The contractor responsible for a hazard category 1, 2, or 3 DOE existing nuclear facility must submit for DOE approval a procedure for its USQ process.

The contractor responsible for a hazard category 1, 2, or 3 DOE new nuclear facility must submit for DOE approval a procedure for its USQ process on a schedule that allows DOE approval in a safety evaluation report issued pursuant to section 207(d) of 10 CFR 830.

The contractor responsible for a hazard category 1, 2, or 3 DOE nuclear facility must implement the DOE-approved USQ procedure in situations where there is a

- temporary or permanent change in the facility as described in the existing DSA,
- temporary or permanent change in the procedures as described in the existing DSA,
- test or experiment not described in the existing documented safety analysis, or
- potential inadequacy of the documented safety analysis because the analysis potentially may not be bounding or may be otherwise inadequate.

A contractor responsible for a hazard category 1, 2, or 3 DOE nuclear facility must obtain DOE approval prior to taking any action determined to involve a USQ.

The contractor responsible for a hazard category 1, 2, or 3 DOE nuclear facility must annually submit to DOE a summary of the USQ determinations performed since the prior submission.

If a contractor responsible for a hazard category 1, 2, or 3 DOE nuclear facility discovers or is made aware of a potential inadequacy of the DSA, it must

- take action, as appropriate, to place or maintain the facility in a safe condition until an evaluation of the safety of the situation is completed;
- notify DOE of the situation;
- perform a USQ determination and notify DOE promptly of the results; and
- submit the evaluation of the safety of the situation to DOE prior to removing any operational restrictions.

Quality Assurance Requirements

Contractors conducting activities, including providing items or services, that affect, or may affect, the nuclear safety of DOE nuclear facilities must conduct work in accordance with the quality assurance criteria in 10 CFR 830.122.

The contractor responsible for a DOE nuclear facility must

- submit a QAP to DOE for approval and regard the QAP as approved 90 days after submittal, unless it is approved or rejected by DOE at an earlier date;
- modify the QAP as directed by DOE;

- annually submit any changes to the DOE-approved QAP to DOE for approval. Justify in the submittal why the changes continue to satisfy the quality assurance requirements;
- conduct work in accordance with the QAP.

The QAP must

- describe how the quality assurance criteria of 10 CFR 830.122 are satisfied;
- integrate the quality assurance criteria with the safety management system, or describe how the quality assurance criteria apply to the safety management system;
- use voluntary consensus standards in its development and implementation, where practicable and consistent with contractual and regulatory requirements, and identify the standards used; and
- describe how the contractor responsible for the nuclear facility ensures that subcontractors and suppliers satisfy the criteria of 10 CFR 830.122.

Technical Safety Requirements

A contractor responsible for a hazard category 1, 2, or 3 DOE nuclear facility must

- develop TSRs that are derived from the documented safety analysis,
- prior to use, obtain DOE approval of TSRs and any change to TSRs, and
- notify DOE of any violation of a technical safety requirement.

A contractor may take emergency actions that depart from an approved TSR when no actions consistent with the TSR are immediately apparent and when these actions are needed to protect workers, the public, or the environment from imminent and significant harm. Such actions must be approved by a certified operator for a reactor or by a person in authority as designated in the TSR for nonreactor nuclear facilities. The contractor must report the emergency actions to DOE as soon as practicable.

A contractor for an environmental restoration activity may follow the provisions of 29 CFR 1910.120 or 1926.65 to develop the appropriate hazard controls (rather than the provisions for TSRs), provided the activity involves either

- work not done within a permanent structure, or
- the decommissioning of a facility with only low-level residual fixed radioactivity.

Occupational Radiation Protection

A DOE activity shall be conducted in compliance with a documented RPP as approved by the DOE.

The DOE may direct or make modifications to an RPP.

The content of each RPP shall be commensurate with the nature of the activities performed and shall include formal plans and measures for applying the ALARA process to occupational exposure.

The RPP shall specify the existing and/or anticipated operational tasks that are intended to be within the scope of the RPP.

The content of the RPP shall address, but shall not necessarily be limited to, each requirement in10 CFR 835.

The RPP shall include plans, schedules, and other measures for achieving compliance with regulations of this part. Unless otherwise specified in this part, compliance with amendments to this part shall be achieved no later than 180 days following approval of the revised RPP by DOE. Compliance with the requirements of 10 CFR 835.402(d) for radiobioassay program accreditation shall be achieved no later than January 1, 2002.

An update of the RPP shall be submitted to DOE

- whenever a change or an addition to the RPP is made,
- prior to the initiation of a task not within the scope of the RPP, or
- within 180 days of the effective date of any modifications to 10 CFR 835.

Changes, additions, or updates to the RPP may become effective without prior Department approval only if the changes do not decrease the effectiveness of the RPP and the RPP, as changed, continues to meet the requirements of 10 CFR 835. Proposed changes that decrease the effectiveness of the RPP shall not be implemented without submittal to and approval by the Department.

An initial RPP or an update shall be considered approved 180 days after its submission unless it is rejected by DOE at an earlier date.

c. Demonstrate an understanding that violations of applicable nuclear safety rules and regulations are enforceable criminally and civilly.

For all contractors, subcontractors, and suppliers thereto, DOE has the authority to issue notices of violation when noncompliances with nuclear safety requirements are identified. In addition, for cases involving for-profit contractors, DOE has the authority to issue fines for violations of nuclear safety rules, up to $110,000 per day per occurrence. Civil penalties are not applicable to individual employees or to contractors specifically exempted by section 234A(d) of the Atomic Energy Act of 1954 (as amended).

References: 10 CFR 820

d. Demonstrate an understanding of the topics below, associated with the PAAA:

- **Procedural Rules for DOE Nuclear Activities (10 CFR 820);**
- **Documented Safety Analyses (10 CFR 830, subpart B);**
- **Unreviewed Safety Questions (10 CFR 830, subpart B);**
- **Quality Assurance Requirements (10 CFR 830, subpart A);**
- **Technical Safety Requirements (10 CFR 830, subpart B); and**
- **Occupational Radiation Protection (10 CFR 835).**

Procedural Rules for DOE Nuclear Activities

The legal framework for implementing DOE's Nuclear Safety Enforcement Program is established in 10 CFR 820, "Procedural Rules for DOE Nuclear Activities." The responsibility for program development and implementation has been assigned to the enforcement and investigation staff (HS-40) in the Office of Health, Safety and Security. The enforcement program relies on existing DOE management systems and technical

resources to assure that the enforcement process properly considers the actual or potential safety significance of a violation when determining an appropriate enforcement sanction.

Currently, seven rules have been issued:

1. 10 CFR 820, "Procedural Rules for DOE Nuclear Activities"
2. 10 CFR 830, subpart A, "Quality Assurance Requirements"
3. 10 CFR 830, subpart B, "Safety Basis Requirements"
4. 10 CFR 835, "Radiation Protection"
5. 10 CFR 824, "Procedural rules for the Assessment of civil penalties for Classified Information Security Violations"
6. 10 CFR 851, "Worker Safety and Health"
7. 10 CFR 708, "DOE Contractor Employee Protection Program"

Detailed information regarding specific requirements is available at http://www.io.bnl.gov/paaa.htm.

e. Discuss the role of Federal line management with respect to implementing the requirements of the PAAA.

Title 10 CFR 820 establishes the legal framework for implementing DOE's Nuclear Safety Enforcement Program. The responsibility for program development and implementation has been assigned to the Enforcement and Investigation Staff (EH-6) in the Office of Environment, Safety and Health. The enforcement program relies on existing DOE management systems and technical resources to ensure that the enforcement process properly considers the actual or potential safety significance of a violation when determining an appropriate enforcement sanction.

Under DOE P 450.5, DOE line management also has responsibility for assessment of the adequacy of the contractor's ES&H performance.

DOE G 450.4-1B, Integrated Safety Management System Guide for Use with Safety Management System Policies (DOE P 450.4, DOE P 450.5, and DOE P 450.6); the Functions, Responsibilities, and Authorities Manual; and the Department of Energy Acquisition Regulation, states that EH-6 establishes PAAA enforcement policies and procedures, investigates potential violations, and initiates and resolves enforcement actions, as warranted. In contrast to contract management/enforcement, PAAA enforcement is performed independently of line management and provides added assurance to Congress and the public that DOE contractors are meeting DOE's nuclear safety requirements.

DOE fulfills its nuclear safety and high-risk responsibility by

- investigating potential violations of enforceable requirements, as well as certain nuclear safety and worker safety and health concerns raised by workers;
- initiating and resolving enforcement actions in accordance with the process and procedures set forth in 10 CFR part 820, "Issues Notices of Violation";
- managing and developing programs and policies that encourage contractor self-identification, reporting, and correction of potential non-compliances through the Noncompliance Tracking System;

- conducting PAAA program reviews of DOE contactors' identification, screening, and reporting of non-compliances to ensure consistency with expectations and encourage excellence in performance assessment.

f. Discuss the role of the site's PAAA coordinator.

The PAAA compliance validation program is part of the independent oversight office and is administered by the PAAA coordinator. The PAAA coordinator interfaces directly with senior management to ensure effective implementation of the compliance validation program.

As found in DOE-HDBK-1085-95,

> It is desirable that each DOE organization identify a DOE PAAA Coordinator who will be the primary person responsible for interaction with the Enforcement and Investigation Staff and contractor personnel on Price-Anderson matters. Examples of activities performed by this individual would likely include the following:
>
> - Key person to collect information or coordinate with appropriate personnel to provide information and collaborate with the Enforcement and Investigation
> - Staff in evaluating the facts of potential noncompliances reported into the NTS.
> - Key person to coordinate the identification of personnel for technical support when necessary to bring an issue to closure.
> - Key person to provide status of closure and confirmation of the verification process for closure of safety significant noncompliances.
> - Key person to coordinate the periodic evaluation of potential noncompliances of less safety significance tracked locally by the contractor.
> - Key person to assure the flow of relevant information between the DOE Field Organization and the Enforcement and Investigation Staff.

g. Review the recent PAAA notices and decisions with the site's PAAA coordinator to determine close-out status and verification of corrective actions.

Note: This element is performance based. The Qualifying Official will evaluate its completion.

17. An STSM shall have a working level knowledge of the DNFSB purpose and their interaction with the DOE.

a. Discuss the enabling legislation and the purpose of the Defense Nuclear Facilities Safety Board (DNFSB).

The DNFSB is an independent executive branch agency responsible for providing advice and recommendations to the President and the Secretary of Energy regarding public health and safety issues at departmental defense nuclear facilities.

The board is chartered by Congress to perform the following functions:

- Review and evaluate the content and implementation of the standards relating to the design, construction, operation, and decommissioning of departmental defense nuclear facilities (including applicable departmental Orders, regulations, and requirements)
- Investigate any event or practice at departmental defense nuclear facilities that has adversely affected or may adversely affect public health and safety
- Analyze design and operational data, including safety analysis reports, from any departmental defense nuclear facility
- Review the design and construction of a new departmental defense nuclear facility and make recommendations considered necessary to protect public health and safety
- Make such recommendations to the Secretary with respect to departmental defense nuclear facilities, including operations of such facilities, standards, and research needs, as the board determines are necessary to ensure adequate protection of public health and safety

The DNFSB's enabling legislation is available for review at https://www.hss.doe.gov/deprep The specific reference is 42 U.S.C. 2286.

b. Identify and discuss applicable DNFSB Recommendations.

The board issues recommendations to the Secretary on issues or circumstances that it determines need to be resolved to ensure adequate protection of the public health and safety. The Secretary must respond to each board recommendation within 45 days of its publication in the *Federal Register*.

Below is a list of all open DNFSB recommendations, as of September 2007. This link, http://www.hss.energy.gov/deprep/archive/rec/status.asp, will take you to the Web site, where you can review recommendations that pertain to your facility (when specific to a site) or that are applicable to the entire DOE complex.

Rec.	Subject	Open	Closed
92-4	Multi-Function Waste Tank Facility at Hanford	X	
94-1	Improved Schedule for Remediation	X	
97-1	Safe Storage of Uranium-233	X	
98-1	Resolution of Safety Issues Identified by DOE Internal Oversight	X	
98-2	Safety Management at the Pantex Plant	X	
2000-1	Prioritization for Stabilizing Nuclear Materials	X	
2000-2	Configuration Management, Vital Safety Systems	X	
2001-1	High-Level Waste Management at the Savannah River Site	X	
2002-1	Quality Assurance for Safety-Related Software	X	
2002-3	Requirements for the Design, Implementation, and Maintenance of Administrative Controls	X	
2004-1	Oversight of Complex, High-Hazard Nuclear Operations	X	

Rec.	Subject	Open	Closed
2004-2	Active Confinement Systems	X	
2005-1	Nuclear Material Packaging	X	

Source: https://www.hss.doe.gov/deprep/archive/rec/status.asp Summary Table

c. Identify and discuss Department Implementation Plans and commitments made in response to DNFSB recommendations.

When a board recommendation is received, the departmental representative should coordinate with the affected Secretarial Officers to designate the CSO. If necessary, the Deputy Secretary should resolve any disagreements regarding designation of the CSO. The CSO should oversee the development of the Department's response and if the recommendation is accepted, the associated implementation plan, resolution of the applicable safety issues, and ultimate closure of the recommendation.

The cognizant Secretarial Officer should designate a responsible manager, typically a Deputy Assistant Secretary or operations/site office manager, to manage development and implementation of an adequate response and if necessary, an implementation plan for resolving the board recommendation. The responsible manager should possess sufficient stature and authority to obtain the necessary commitments of action from the various organizations involved. An operations/site office manager should be considered for recommendations that are limited to a single site; a Deputy Assistant Secretary is more appropriate for recommendations with implications for multiple sites and organizations. This responsible manager may, in turn, identify a technical lead to assist in coordinating response development and implementation planning. The selection of an appropriate responsible manager and an experienced technical lead with the necessary technical, communications, and management skills is essential to the Department's success. The continuous commitment of the responsible manager and technical lead throughout the life of a recommendation has also proven to be important for effective departmental interface with the board.

The responsible manager should establish a response team to support the development and implementation of the Department's response. Secretarial offices and operations/site offices expected to be major stakeholders in the implementation plan should provide members for this team. The points of contact should assist the responsible manager in obtaining appropriate team participation from their respective organizations, including field representatives, as appropriate. Team participants should have the authority to speak for their management. The responsible manager should solicit early involvement of the Office of the General Counsel to support the response team in addressing legal issues or procedural requirements. The departmental representative's office should designate an issue lead to support the responsible manager as a member of the response team.

The response team should promptly begin development of the Department's response and the associated implementation plan, if expected to be necessary. To promote timeliness and responsiveness, affected departmental elements should follow the process presented in attachment 2 and figure 2 of DOE M 140.1-1B, *Interface with the Defense Nuclear Facilities Safety Board*.

The response team should, as a minimum, consider the following topics:

- Significant safety issues associated with the recommendation
- Underlying causes and implications of these issues
- Existing programs and activities that can be built upon
- Strategic input from affected departmental elements
- Public comments forwarded from the board
- Costs and benefits associated with implementation
- The impact on ongoing departmental programs and activities

The response team should seek discussions with one or more board members to fully understand the board's views regarding the underlying safety issues and potential resolution approaches.

Prior to obtaining concurrence on the Secretary's response letter, the responsible manager should estimate the associated costs and contribution to safety and brief departmental senior management concerning this information.

Specific Department implementation plans are available at the DOE Web site, www.energy.gov, but are site specific. Candidates are encouraged to locate the plan(s) that relate to their area(s) of responsibility.

d. Discuss the roles and responsibilities of the Departmental Representative to the DNFSB as described in DOE M 140.1-1B, Interface with the Defense Nuclear Facilities Safety Board.

The responsibilities of the departmental representative to the DNFSB are the following:

- Represents the Secretary in regular and continuing interactions with the board
- Advises the Secretary, Deputy Secretary, Secretarial Officers, and other departmental officials on board priorities, concerns, actions, and plans
- Manages departmental interface activities and provides direction and advice to line management on board-related matters
- Coordinates with affected Secretarial Officers and designates a cognizant Secretarial Officer to respond to a board recommendation, board correspondence, or other board issue
- Facilitates communication and cooperation between departmental elements and the board and its staff
- Reviews written communications to the board (with the exception of responses to information requests) for consistency and responsiveness, and provides concurrence approval or disapproval
- Manages the Department's ISMS for board-related issues, commitments, and actions
- Maintains awareness of line implementation of departmental commitments to the board and takes appropriate action to focus line management attention on resolving the identified safety and management issues
- Prepares reports on board-related activities for senior departmental management, Congress, and the President
- Provides guidance and training on this Manual to departmental points of contact and support personnel
- Maintains and distributes a listing of key departmental personnel for board-related activities

- Maintains the Department's central repository of official board communications and makes this information available to departmental and contractor personnel
- Facilitates board review of departmental directives, rules, and standards

In a March 27, 2006, memorandum to all Department elements, the Deputy Secretary of Energy rescinded an earlier requirement for all field organization correspondence to the DNFSB to be coordinated through their respective DNFSB site representative.

e. Prepare and/or participate in a briefing to the DNFSB on the status of a Departmental activity or initiative.

Note: This element is performance based. The Qualifying Official will evaluate its completion.

18. An STSM shall have a working level knowledge of problem identification, solving, and decision making techniques.

a. Describe and explain the application of problem analysis techniques in:
- **Root cause analysis;**
- **Causal factor analysis;**
- **Change analysis; and**
- **Barrier analysis.**

Root Cause Analysis

DOE O 225.1A, *Accident Investigations*, defines "root cause" as the causal factor(s) that, if corrected, would prevent recurrence of the accident.

DOE G 225.1A-1, *Implementation Guide for Use with DOE O 225.1A, Accident Investigations*, states that a root cause analysis should be conducted for each accident investigation. The methodology used is not as important as the results.

Causal Factor Analysis

DOE G 433.1-1, *Nuclear Facility Maintenance Management Program Guide for Use with DOE O 433.1*, states that causal factor charting uses a block diagram to depict cause and effect. This technique is most effective for solving complicated problems because it provides a means to organize the data, provides a concise summary of what is known and unknown about the event, and results in a detailed sequence of facts and activities. The first block on the chart is the primary effect. For each effect, there is a cause that becomes the effect in the next block to the right. For each cause (effect), two reasons that are known to be true are listed in a block just below the cause (effect). If only one reason is known or the reason is uncertain, then all possible causes should be evaluated as potential causes. When this process gets to the point where a cause can be corrected to prevent recurrence of the event, the root cause has been found.

Change Analysis

Change analysis is used when the problem is obvious. It is generally used for a single event and looks at a problem by analyzing the discrepancy between what is expected and what actually happened. The evaluator essentially asks what differences occurred in this task or

activity to make its outcome different this time from all other times. This technique consists of asking What? When? Where? Who? How? The answers should provide direction toward answering the root-cause-determination question, Why?

Barrier Analysis

Barrier analysis is a systematic questioning process that can be used when the problem appears to be programmatic. It identifies physical, administrative, and procedural controls, and other controls or barriers that should have prevented an event from happening. This technique should be used to assess why existing barriers, both physical and administrative, failed and what additional barriers are needed to prevent recurrence. Secondary questions in this technique ask Why? and How do you know?

DOE G 231.1-2, Occurrence Reporting Causal Analysis Guide, and DOE G 225.1A-1, Implementation Guide for use with DOE O 225.1, Accident Investigations, provide detailed descriptions of each technique.

References: DOE-NE-STD-1004-94

b. Describe and explain the application of the following Root Cause Analysis processes in the performance of occurrence investigations:
- **Events and causal factors charting;**
- **Root cause coding; and**
- **Recommendation generation.**

Events and Causal Factors Charting

The events and causal factors (E&CF) chart (or diagram) depicts in logical sequence the necessary and sufficient events and causal factors for accident occurrence. It can be used not only to analyze the accident and evaluate the evidence during investigation, but also can help validate the accuracy of pre-accident systems analyses. The E&CF sequence charting technique is an integral and important part of the MORT-based DOE accident investigation process. It is used in conjunction with other key MORT tools, such as MORT tree analysis, change analysis, and energy trace and barrier analysis, to achieve optimum results in accident investigation. E&CF charting has been used successfully as a focal point of analysis on several DOE accident and incident investigations with excellent results.

Root Cause Coding

Root cause coding is a useful tool that enables an investigator visualize the various root causes, as well as contributing causes. The coding system is depicted in table form in appendix A of this reference guide, and is broken down into seven main categories: (1) equipment/material problem, (2) procedure problem, (3) personnel error, (4) design problem, (5) training deficiency, (6) management problem, and (7) external phenomenon.

Recommendation Generation

Recommendation generation provides for valuable input to program management that should lead to improved safety practices, with the ultimate goal of avoiding future similar occurrences and accidents. Based on the review of an occurrence's facts and environment, sound analysis, using a graded approach, should provide an avenue to achieve that goal.

Recommendations are generated through coordination with the accident investigation program manager, as outlined in DOE G 225.1-1A, and DOE O 225.1A.

References: DOE-NE-STD-1004-94

c. Describe the elements of an effective issue management system and its importance to safety.

DOE O 226.1, *Implementation of Department of Energy Oversight Policy,* states that contractors must ensure that a comprehensive, structured issues management system is in place. This system must provide for the timely and effective resolution of deficiencies and be an integral part of an effective contractor assurance system. Issues management must include structured processes for

- determining the risk, significance, and priority of deficiencies;
- evaluating the scope and extent of the condition or deficiency (e.g., applicability to other equipment, activities, facilities, or organizations);
- determining event reportability under applicable requirements (e.g., PAAA, Occurrence Reporting and Processing System, security incident reporting);
- identifying root causes (applied to all items using a graded approach based on risk);
- identifying and documenting suitable corrective actions and recurrence controls, based on analyses, to correct the conditions and prevent recurrence;
- identifying individuals/organizations responsible for implementing corrective actions;
- establishing appropriate milestones for completion of corrective actions, including consideration of significance and risk;
- tracking progress toward milestones such that responsible individuals and managers can ensure timely completion of actions and resolution of issues;
- verifying that corrective actions are complete;
- validating that corrective actions are effectively implemented and accomplish their intended purposes, using a graded approach based on risk; and
- ensuring that individuals and organizations are accountable for performing their assigned responsibilities.

d. Describe the following types of investigations and discuss an example of the application of each:
- **Type A; and**
- **Type B.**

DOE O 225.1A, *Accident Investigations*, states that DOE field elements shall categorize the type of an investigation in accordance with the algorithm in attachment 2 of DOE O 225.1A to determine if a Type A or Type B investigation is required. Categorization of all Type A and Type B accident investigations should be reported in a timely manner to the Office of the Deputy Assistant Secretary for Oversight (EH-2). Categorization should be made expeditiously, taking into account that timeliness is crucial to conducting an accurate investigation, preserving the accident scene and evidence, and identifying causal factors. A Type A investigation is conducted for the more serious accidents and is appointed and managed by the Office of the Assistant Secretary for Environment, Safety, and Health. A Type B investigation is appointed and managed at the field level. However, the elements of the investigation and the report format are the same.

Type A and Type B accidents reflect similar types of effects, but are distinctly different regarding the severity of these effects. For comparison purposes, those effects are depicted in table form in appendix B of this reference guide. The table is also found in DOE G 225.1-1A.

There is one area of commonality regarding Type A and Type B investigations — cost estimating. When the cost of an accident is estimated, the methods in DOE Guide 430.1-1, *Cost Estimating Guide*, should be used.

e. Discuss the necessary considerations that must be addressed when developing a corrective action.

Corrective actions are developed as part of a robust system of assurances. Considerations that must be addressed include

- efficacy of the corrective action (will it fix the problem?)
- level of effort required to implement
- availability of resources to implement
- ability to track and verify success
- risk associated with the implementation of the corrective action through the concept of a graded approach
- impact/value of implementation
- establishment of milestones for complicated or extensive corrective actions

DOE G 414.1-5 describes the essence of a successful corrective action program at any level, which involves a combination of processes, people, and tools for systematic implementation and follow-up programs. Principal considerations within that guide include the following:

- Keep the corrective action process simple. The process should be clear-cut and easy to use, employ user friendly tools, and not require a tremendous amount of manpower or training.
- Involve all personnel as stakeholders in the program. Clearly define roles and responsibilities in identifying and reporting problems, and their importance to the effectiveness of the program in enhancing the mission performance and safety of the site/organization.
- Provide easy access for gathering reporting information across the site/organization to capture vital information.
- Maintain strong management support and emphasis. An active management that demonstrates ownership of the program, encourages employees at all levels in the organization to participate, and is visually involved in directing and setting clear well-defined processes and resources is crucial to the success of the program. The manager responsible for the site/organization implementing the corrective action program should be the overall manager of the program and be held accountable for meeting program requirements and suspense dates.
- Periodically assess the effectiveness and direction of the program in meeting goals and objectives.
- Automate data collection and processing wherever possible. This will promoteeasier, more accurate, timely tracking and follow-up.
- Provide timely feedback including lessons learned, on program actions so members can see results and be encouraged to support the process.

- Perform a reliable trending analysis of identified problems and associated causes to identify repeat occurrences, generic issues, and weaknesses at a level before they pose a more significant problem.

f. Discuss the immediate, short-term, and long-term actions taken as the result of problem identification or an occurrence.

According to DOE G 231.1-2, *Occurrence Reporting Causal Analysis Guide*, corrective actions should be identified to remedy the problem (immediate actions), prevent recurrence of the specific problem (short-term actions), and preclude occurrence of similar problems (long-term actions). INPO has developed a list of error precursors that are useful in preventing events from occurring. These error precursors are listed in attachment 5 of DOE G 231.1-2. It provides extensive information on the development, implementation, and follow-up of corrective action programs. The guidance may be considered and applied using a graded approach based on the significance, criticality, sensitivity, risk, and/or impact of each finding to the mission, safety, and security of the site, the public, and regulatory requirements. The guidance may assist managers and contractors during the course of ongoing work activities, operational events, informal and formal individual and organizational self-assessments, internal and external oversight, investigations, regulatory actions, audits, inspections, worker safety concerns, design reviews, analyses, and other types of incidents or assessments.

g. Describe the assessment requirements and limitations associated with the interface with contractor employees.

Requirements for program assessments can be found in 10 CFR 830, Subpart A. Additional requirements are also located in DOE O 226.1, which encompass management assessments, self-assessments, and independent assessments. Further, DOE O 414.1C, *Quality Assurance,* dictates similar management assessments and independent assessments.

There are three basic assessment methodologies: document review, interview, and direct observation. The limitations inherent to these methodologies are discussed below.

Document Review

- It is difficult if not impossible to determine whether the facility under assessment is operating according to written procedures.

Interview

- The value of the content of the interview is only as good as the interviewer's skill allows.
- Subsequent verification of the interview content is usually required to confirm the accuracy of what was stated.

Direct Observation

- Heisenberg's uncertainty principle applies, which states, "It is difficult to make accurate measurement without affecting what is to be measured."

h. Explain the essential elements of the following activities:
- **Investigation;**

- **Fact-finding;**
- **Reporting;**
- **Tracking to closure;**
- **Follow-up; and**
- **Corrective action implementation.**

Investigation

The best way to evaluate an investigation program is to observe it in action. Another effective method is to take an investigative report and associated records and review them. Items that an assessor could look for when conducting reviews include

- the list of personnel contacted during the event
- the overall format and content of the report
- the thoroughness of the investigation
- indications of investigator bias as a result of preconceived ideas about what the investigation results should be
- the history of the facility

By reviewing the items listed above, an accurate picture of the capability of one investigator can be drawn. This, however, may or may not be representative of the site. To get a better picture of the program as a whole, a second report done by a different investigator should be reviewed to determine if there is consistency in the overall site or activity program. This type of review can be time consuming; therefore, assessors may want to pursue only a few aspects of this review in detail.

Fact Finding

Assessments seek to ensure that performance expectations as defined by management and process owners are being met. The assessor should clearly understand the basis for performance in a program, system, or process. Requirements for performance as dictated by the scope of the assessment must be researched and understood. These requirements are found in the following source documents:

- Federal and state regulatory requirements
- Appropriate codes and standards
- Contract requirements
- DOE Orders, Manuals, and Notices
- Implementation plans
- Implementation procedures
- Facility safety documents
- Policy and mission statements
- DOE-approved WSS and/or S/RIDS
- Plans and programs

Performance information from the following sources provides insight into organizational performance:

- Reports from outside regulators
- Facility operations reports
- Performance reviews
- Previous assessment reports
- Internal inspections, reviews, and reports

- Corrective action plans and status reports
- Concerns and occurrence reports
- Performance indicators

Requirements contained in these documents are selected based upon impact on the assessed organization's mission and the relationship to the scope of the assessment. From selected requirements, objective statements (performance measures) are developed for determining whether or not a program, system, and/or process is working. From these measures, the specific performance criteria (based on written programs, DOE Orders, rules, etc.) are developed, and tools are selected for conducting the appraisal. In developing performance criteria, assessment personnel cannot reinterpret or redefine requirements specified in the source documents.

Reporting

Independent assessment programs and, less formally, management assessment programs, call for the development of an assessment report as a vehicle to communicate the issues identified during an assessment. The assessment report may be informal or formal, depending on the level of assessment performed. The report must provide a clear picture of the results in terms of the programs, systems, and processes assessed. The report should be clear and easy to understand and should include only facts that directly relate to assessment observations and results. It should include sufficient information to enable the assessed organization to develop and implement appropriate improvement plans and to check the report for accuracy (if such a check was not done during the assessment). Every effort should be made to ensure assessment reports are concise, accurate, and understandable. In preparing the report, authors should remember that many people who will read the report have had no active role in the assessment and the report may be their only source of information regarding its conduct and results. For example, summary information may be clearer or more easily understood if presented graphically. Specific report formats may vary considerably from one organization to the next. In developing a report format, the assessment organization should solicit input from report recipients to ensure it meets their needs.

A sample assessment report is available in DOE-EM-STD-5505-96.

Tracking to Closure

After a reasonable period of time has elapsed, follow-up activities should be performed to verify the effectiveness of the corrective action and how it was implemented. There are several ways to verify the implementation of corrective action, including

- a reassessment of the deficient areas;
- review of new or revised quality-affecting documents such as manuals, procedures, training records, etc.;
- verification during the next scheduled assessment; and
- verification by conducting a surveillance covering the areas of concern.

The key thing to remember when verifying corrective action implementation is that verification is necessary. A solution to a problem may look good on paper but may not be readily implementable. The failure to adequately identify all root causes will most likely result in a recurrence of the deficiency.

Follow-up

An appropriate amount of follow-up is necessary to ensure the effectiveness of the corrective action process and to reestablish confidence in the item/service assessed.

Corrective Action Implementation

Management responsible for the activities assessed is also responsible for the development of effective corrective action of the problem areas or deficiencies discovered during the assessment. As a minimum, the corrective action should address

- measures to correct each deficiency
- identification of all root causes for significant deficiencies
- determination of the existence of similar deficiencies
- corrective actions to preclude recurrence of like or similar deficiencies
- assignment of corrective action responsibility
- completion dates for each corrective action

For independent assessments, the proposed corrective action should be reviewed for concurrence by the assessment team leader. This will help ensure that the planned actions will be effective in resolving the problem areas and deficiencies reported by the assessment team.

References: DOE G 414.1-5

i. Describe the actions to be taken if the contractor challenges the assessment findings and explain how such challenges can be avoided.

Disputes over the corrective action plan or its implementation (such as timeliness or adequacy) must be resolved at the lowest possible organizational level. The organization that disagrees with the disposition of a given issue may elevate the dispute, in a step-wise manner through the management hierarchy, for timely resolution. The dispute must be raised via a deliberate and timely dispute resolution process that provides each party with equal opportunity for input and a subsequent opportunity to appeal decisions up to the Secretary of Energy, if necessary.

References: DOE G 414.1-5

j. Discuss the key processes used in the trending and analysis of operations.

The processes found in DOE Order 5480.26 are identified in three main categories. These are performance indicators, trending and analysis, and reportable performance indicators. Each category is discussed below, as found in the Order.

Performance Indicators

- For all DOE facilities included in the DOE PI program, contractors shall provide their PI report addressing the specified list of Performance Indicators, provided in subparagraph c below, to the cognizant PSO, through the cognizant Field Organization, on a quarterly basis. For those facilities identified in appendix 1 of DOE-STD-1048-92, which do not report to a Field Office, their quarterly report should be sent directly to the cognizant PSO.

- Departmental elements not included in the formal DOE PI Program shall internally establish and track operations using PIs appropriate to their organizations but are excluded from formal reporting requirements defined in DOE-STD-1048-92.
- Performance Indicators are designed to be reportable as numerical values on a consistent basis so that they are readily usable in trending analysis. For each facility included in the DOE PI program, the contractor shall gather, analyze and report the Performance Indicators data, to include narrative data, according to the requirements of this Order and the guidance provided in DOE-STD-1048-92.
- The quarterly contractor, Field Office, and PSO Performance Indicator reports shall follow the format and content provided in DOE-STD-1048-92.
- The detailed schedule for submittal of PI data and all quarterly PI reports is provided in DOE-STD-1048-92.

Trending and Analysis

- Contractors for each facility, group of facilities, or site shall review and assess their Performance Indicators and other operations information such as reportable occurrences. Facility Managers shall assess their facility operating information for trends and indications of deteriorating/ improving conditions and identify lessons-learned and good practices that should be used in their facility to prevent occurrences or to improve safety and/or operations.
- Each level of DOE line management shall adopt the use of trending and analysis of Performance Indicators and other operations information, such as reportable occurrences, at all levels of operations to provide ongoing feedback to operators, support personnel, and managers of the condition and performance of their operations with the intent of identifying deficiencies/good practices and opportunities for improvement in safety and performance of their operations.

Reportable Performance Indicators

- The Performance Indicators delineated in DOE-STD-1048-92 are the minimum required to be reported for each facility. For some facilities, certain information may not be applicable and, therefore, need not be reported. However, the report should so indicate. It is also expected that DOE line management may request additional Performance Indicators to be reported which they may determine to be relevant to their facilities. Detailed definitions and information concerning these PIs can be found in DOE-STD-1048-92.

k. Discuss the key process to develop and implement metrics and performance measures, validate performance against metrics and performance measures, and trend/analyze data to establish a continuous improvement program.

Metrics and other performance measures are part of a program that identifies, gathers, verifies, analyzes, trends, disseminates, and makes use of ES&H performance indicators to improve the performance of DOE facilities, programs, and organizations. The program should include the following actions:

- Gather, verify, analyze, trend, and disseminate ES&H performance indicator data, including narrative data, which can help assess performance; where appropriate, perform root cause analyses.

- Implement feedback mechanisms for identification and communication of ES&H good practices, lessons learned, and corrective actions.
- Maintain a management information system containing appropriate ES&H performance indicator data for historical reference.
- Periodically assess ES&H performance indicator programs to verify that indicators are accurately measuring performance and are resulting in improved performance.

References: DOE G 120.1-5

I. Discuss the importance and key elements of the following:
- **Maintenance history;**
- **Operational incident/occurrence report data;**
- **Security infractions;**
- **Safety incidents;**
- **Radiation exposure and incident reporting;**
- **Schedule variances; and**
- **Counterfeit and suspect parts.**

Maintenance History

According to DOE G 433.1-1, a maintenance history and trending program should be maintained to document data and performance trending of facility systems and components. The documentation of complete, detailed, and usable history will be increasingly important as plant-life extension becomes an issue. The history files should contain component identification numbers and descriptions; complete maintenance records for all components/facilities in the system; diagnostic monitoring data; and relevant correspondence, including that with vendors or manufacturers.

Operational Incident/Occurrence Report Data

Per DOE M 231.1-2, the key elements of an occurrence report include the specifics of the event — the "what, who, when, where, and how," the safety issues involved, and the actions taken. These elements are of critical importance in developing appropriate corrective actions to mitigate any potential recurrence.

Security Infractions

The national security of the United States could be put at grave risk if a security infraction allowed an adversary unauthorized access to classified information, technologies, or materials. Key elements of an infraction investigation include the specifics of the offending party (name, position, location), the nature of the infraction (release of information or loss of material), the severity of the infraction (classified, controlled, etc.), and whether the release was intentional or accidental. Based on these elements, administrative or legal actions may be taken.

Safety Incidents

Prompt attention to a safety incident is of critical importance to mitigate the potential for ongoing dangers to workers, the public, and the environment. Elements of safety incidents include environmental, mechanical, and human factors, that when combined in a certain combination, lead to safety incidents. Root cause analysis can be used to identify these elements as a means to develop and implement corrective actions.

Radiation Exposure and Incident Reporting

DOE M 231.1-1A describes the Radiation Exposure Monitoring System Repository. This is a key element of the reporting mechanism, as it is a database that accumulates individual exposure data, thus providing baseline exposure levels, along with overall exposure data. Its use ensures the continued safety and health of the individual by limiting excessive exposure while the individual performs DOE work.

The same manual describes the program through which incident reports are completed and submitted. The Computerized Accident/ Incident Reporting System (CAIRS) allows for data to be input by two distinct methods, but contain the same data. The first is direct entry into CAIRS, and the second is a bulk upload of data from a remote computer. The manual also provides frequency of submission, and a cross-check feature to ensure information at the local level matches what is being shown in CAIRS

Schedule Variances

A schedule variance can be positive (ahead of schedule) or negative (behind schedule). In the former case, there is less cause for concern because there is little or no perceived impact to the health or safety of workers, the public, or the environment. In the latter case, issues may arise due to delays of the implementation of safety features, thus possibly affecting workers or the public. Delays in the proper use of environmental permits (for example, RCRA 90-day waste storage authorizations), and the potential for the assessment of fines or penalties, or even civil litigation are issues that must be addressed with urgency, to mitigate these potential issues. DOE O 413.3 discusses the ramifications of schedule variances and their treatment.

Counterfeit and Suspect Parts

DOE O 414.1B and 10 CFR 830 subpart A, set forth requirements for DOE/NNSA and its contractors to implement effective controls to ensure that items and services meet specified requirements. DOE O 414.1B further requires DOE/NNSA and its contractors to implement processes to prevent entry, detect, control, report, and disposition S/CIs as part of their QA programs. Key elements of these requirements include training, identification, procurement oversight, and inspection.

m. Using DOE O 231.1A, Environment, Safety, and Health Reporting, and DOE M 231.1-2, Occurrence Reporting and Processing of Operations Information, discuss the role of an STSM related to reportable occurrences. Given an occurrence report determine whether:
- **Review processes are adequate;**
- **Causes are appropriately defined;**
- **Corrective actions address causes;**
- **Lessons learned are appropriate; and**
- **Corrective actions are completed.**

An STSM should be able to perform the following functions, found in DOE O 231.1A, if called upon to do so:
- Ensure that occurrence reporting requirements listed in the CRD for DOE M 231.1-2 are applied as appropriate to contracts within 3 months after this Order is approved.

- Ensure that agreements for carrying out occurrence reporting requirements of this Order are established with responsible Secretarial Officers or Deputy Administrators, NNSA.
- Assess contractor capability and performance in carrying out the occurrence reporting requirements of this Order and take actions to correct any weaknesses.
- Provide technical support as necessary to facility representatives or line management staff responding to reportable occurrences.
- Direct facility representatives and/or line management designees to fulfill the occurrence reporting responsibilities required by this Order.

Note: The determination portion of this element is performance based. The Qualifying Official will evaluate its completion.

n. [Note: Competency 18 of the STSM Functional Area Qualification Standard skips from element m to o.]

o. Discuss the process for preparing a minority report and explain the importance of encouraging and evaluating differing professional/technical opinions.

Minority reports are not formally defined, but they are generally submitted by individuals who have a differing opinion regarding the outcome of a group or committee report as it relates to its final conclusion, and therefore are in the minority.

DOE M 442.2-1, *Differing Professional Opinions Manual for Technical Issues Involving Environment, Safety, and Health*, establishes the process to initiate, disposition, and record DPOs from DOE employees for technical issues involving environment, safety, or health. A DPO is a conscientious expression of a professional judgment that differs from the prevailing staff view, disagrees with a management decision or policy position, or takes issue with a proposed or established DOE practice involving technical, legal, or policy issues.

The Department is committed to ensuring that environment, safety, and health issues can be raised without fear of retribution and that these issues are resolved in a timely and effective manner. Employees are encouraged to engage in open, frank, and unrestricted professional discussions across organizational boundaries on technical issues, particularly those related to environment, safety, and health. DOE is committed to the protection of employees from retaliation in any form for expressing differing viewpoints. Managers are required to act on expressed concerns and, if necessary, to stop or curtail work operations as authorized to place the facility or activity in a safe condition until the DPO issue has been resolved.

The DPO process is described in DOE M 442.1-1. The fill-in-the-box form is completed by the dissenting employee and provided to the DPO manager, who with the assistance of an ad hoc technical committee considers the submission. A final decision is made, and the dissenting employee is notified of the outcome. An unfavorable decision may be appealed, should the employee choose to do so.

The DPO may or may not have an impact on the original decision. The importance of this process is to ensure an environment where open communication remains a high priority without fear of retribution for a difference of professional or technical opinion.

p. Lead a team to conduct compliance-based and performance-based assessments. Identify the differences in outcomes and the reasons for these differences.

q. Write, or review and approve, an assessment report.

r. Based on an evaluation of contractor activities, review and approve corrective actions and recommendations, and communicate the results to contractor management.

s. Participate in formal meetings between Department management and assessed organizations management to discuss the results of the assessments.

t. Given incident/occurrence report data for a specified period, analyze the information for contributing factors and safety trends.

u. Given the data for an event, determine the root cause and develop corrective actions. Compare the results with that of the originator. Discuss any differences.

Note: Elements p through u are performance based. The Qualifying Official will evaluate their completion.

19. An STSM shall have a working level knowledge of contract management to assess contractor technical performance.

a. Identify three major DOE contract types and describe the characteristics, and the advantages and disadvantages of each.

Cost-Plus-Award-Fee Contract

A cost-plus-award-fee contract is a cost-reimbursement contract that provides for a fee consisting of a base amount fixed at inception of the contract and an award amount that the contractor may earn in whole or in part during performance and that is sufficient to provide motivation for excellence in such areas as quality, timeliness, technical ingenuity, and cost-effective management. The amount of the award fee to be paid is determined by the Government's judgmental evaluation of the contractor's performance in terms of the criteria stated in the contract. This determination and the methodology for determining the award fee are unilateral decisions made solely at the discretion of the Government.

The cost-plus-award-fee contract is suitable for use when

- the work to be performed is such that it is neither feasible nor effective to devise predetermined, objective incentive targets applicable to cost, technical performance, or schedule;
- the likelihood of meeting acquisition objectives will be enhanced by using a contract that effectively motivates the contractor toward exceptional performance and provides the Government with the flexibility to evaluate both actual performance and the conditions under which it was achieved; and
- any additional administrative effort and cost required to monitor and evaluate performance are justified by the expected benefits.

The number of evaluation criteria and the requirements they represent will differ widely among contracts. The criteria and rating plan should motivate the contractor to improve performance in the areas rated, but not at the expense of at least minimum acceptable performance in all other areas.

Cost-plus-award-fee contracts should provide for evaluation at stated intervals during performance so that the contractor will periodically be informed of the quality of its performance and the areas in which improvement is expected. Partial payment of fee should generally correspond to the evaluation periods. This makes effective the incentive that the award fee can create by inducing the contractor to improve poor performance or to continue good performance. The advantage to the contractor is monetary in nature. The disadvantage to the contractor is that the award fee amount is subject to a judgmental evaluation by the purchasing organization. The contractor faces the possibility of earning a reduced award fee or no award fee if the contractor's performance ranges from marginal to unacceptable. The advantage to DOE is that the contractor is more motivated to perform well. The disadvantage to DOE is increased cost if the award is actually earned.

Cost-Plus-Fixed-Fee Contract

A cost-plus-fixed-fee contract is a cost-reimbursement contract that provides for payment to the contractor of a negotiated fee that is fixed at the inception of the contract. The fixed fee does not vary with actual cost, but may be adjusted as a result of changes in the work to be performed under the contract. This contract type permits contracting for efforts that might otherwise present too great a risk to contractors (an advantage), but it provides the contractor only a minimum incentive to control costs.

A cost-plus-fixed-fee contract is suitable for use when either of the following conditions of FAR part 16.301-2 is present:

- The contract is for the performance of research or preliminary exploration or study, and the level of effort required is unknown.
- The contract is for development and test, and using a cost-plus-incentive-fee contract is not practical.

A cost-plus-fixed-fee contract normally should not be used in the development of major systems once preliminary exploration, studies, and risk reduction have indicated a high degree of probability that the development is achievable, and the Government has established reasonably firm performance objectives and schedules.

The advantage of this type of contract to the contractor is the inherent risk reduction. The disadvantage is a decreased incentive to perform optimally. The advantage to DOE is a fixed expenditure. The disadvantage is the potential for increased costs due to adjustments.

Cost-Plus-No-Fee Contract

This contract compensates the contractor for costs incurred in management and operations of a facility or installation. No additional fee is paid for contract performance. In contracts with some academic institutions, the contract provides for a management allowance paid by the DOE to cover G&A costs incurred by the parent institution in support of departmental operations.

The advantage to the contractor is the opportunity to have some G&A costs covered that may or may not apply to the contract work (incidental to the contract). The disadvantage to the contractor is decreased incentive for optimal performance. The advantage to DOE is a fixed expenditure — a known quantity.

References: 48 CFR 916

b. Identify and discuss the types of contracting processes that are used to put major contracts in place.

The types of contracting processes that are used to put major contracts in place are

- sealed bidding
- contracting by negotiation

Sealed Bidding

Sealed bidding is a method of contracting that employs competitive bids, public opening of bids, and awards. The following steps are involved:

Preparation of Invitations for Bids. Invitations must describe the requirements of the Government clearly, accurately, and completely. Unnecessarily restrictive specifications or requirements that might unduly limit the number of bidders are prohibited. The invitation includes all documents (whether attached or incorporated by reference) that are furnished to prospective bidders for the purpose of bidding.

Publicizing the Invitation for Bids. Invitations must be publicized through distribution to prospective bidders, posting in public places, and such other means as may be appropriate. Publicizing must occur a sufficient time before public opening of bids to enable prospective bidders to prepare and submit bids.

Submission of Bids. Bidders must submit sealed bids to be opened at the time and place stated in the solicitation for the public opening of bids.

Evaluation of Bids. Bids should be evaluated without discussions.

Contract Award. After bids are publicly opened, an award will be made with reasonable promptness to that responsible bidder whose bid, conforming to the invitation for bids, will be most advantageous to the Government, considering only price and the price-related factors included in the invitation.

Contracting by Negotiation

A contract awarded using other than sealed-bidding procedures is a negotiated contract. There are two types of negotiated contracts: sole source and competitive acquisitions.

Sole Source Acquisitions. When contracting in a sole source environment, the request for proposal should be tailored to remove unnecessary information and requirements, e.g., evaluation criteria and voluminous proposal preparation instructions.

Competitive Acquisitions. When contracting in a competitive environment, the procedures in FAR part 17 are intended to minimize the complexity of the solicitation, the evaluation,

and the source selection decision, while maintaining a process designed to foster an impartial and comprehensive evaluation of offerors' proposals, leading to selection of the proposal representing the best value to the Government.

References: 48 CFR 914
48 CFR 915

[Note: There are two 19.c elements in STSM Functional Area Qualification Standard, DOE-STD-1175-2006.]

c. Discuss how the Statement of Work is developed and contract deliverables are identified, including:
- **Technical specification(s);**
- **Quality assurance requirements; and**
- **Technical review and acceptance of deliverables.**

DOE G 430.1-1, chapter 25, states that the availability of draft specifications for the items of work involved, or the need to develop new specifications, must be considered. Projects requiring preliminary proposals require both an outline specification, which is normally prepared with Title I, and a detailed technical specification. Performance specifications for both the design and installation of facilities and systems will reduce engineering costs.

To accomplish DOE missions and objectives, DOE and its contractors are responsible for a wide range of work activities, including basic and applied research; product development; design, construction, operation, modification, decommissioning, and environmental remediation of DOE facilities and sites; and management and oversight functions relating to these activities. This work must be accomplished safely while minimizing potential hazards to the public, site or facility workers, and the environment consistent with the quality assurance requirements of 10 CFR 830, subpart A, "Quality Assurance." The quality criteria of 10 CFR 830 and DOE O 414.1C, *Quality Assurance*, provide for a quality management system for accomplishing and assessing DOE's work consistent with requirements.

One tool that may be used to ensure contract deliverables are identified and presented for technical review and acceptance is the use of a deliverables matrix. This matrix, in tabular form includes page location of the deliverable within the contract, contract clause or driving directive, due date or frequency (e.g., quarterly), deliverable verbiage, cognizant manager, and action required. If there is a monetary reward associated with a given deliverable, this could be added to the matrix as well. This matrix should be incorporated as an attachment or appendix to the contract, so that both parties have access to the information and related timelines.

c. Discuss the following terms as they apply to financial accountability:
- **Incentives;**
- **Fines and penalties;**
- **Third-party liabilities;**
- **Loss of, or damage to Government property; and**
- **Allowable and non-allowable costs.**

Incentives

Incentive contracts are appropriate when a firm-fixed-price contract is not appropriate and the required supplies or services can be acquired at lower costs and, in certain instances, with improved delivery or technical performance, by relating the amount of profit or fee payable under the contract to the contractor's performance. Incentive contracts are designed to obtain specific acquisition objectives by

- establishing reasonable and attainable targets that are clearly communicated to the contractor and
- including appropriate incentive arrangements

The two basic categories of incentive contracts are fixed-price incentive and cost-reimbursement incentive contracts. Since it is usually to the Government's advantage for the contractor to assume substantial cost responsibility and an appropriate share of the cost risk, fixed-price incentive contracts are preferred when contract costs and performance requirements are reasonably certain. Cost-reimbursement incentive contracts are subject to the overall limitations that apply to all cost-reimbursement contracts.

Fines and Penalties

Costs of fines and penalties resulting from violations of, or failure of the contractor to comply with, Federal, state, local, or foreign laws and regulations are unallowable except when incurred as a result of compliance with specific terms and conditions of the contract or written instructions from the contracting officer.

Third-Party Liabilities

The principle of materiality and full disclosure should govern the inclusion of third-party liabilities. The nature of the liability should be identified and reported, either by a footnote to the financial statement or by actual inclusion of an amount in a liability account if the potential amount due or a loss can be estimated.

Loss of or Damage to Government Property

Contractors are responsible and liable for Government property in their possession, unless otherwise provided by the contract. Generally, Government contracts do not hold contractors liable for loss of or damage to Government property when the property is provided under

- negotiated fixed-price contracts for which the contract price is not based upon any exception;
- cost-reimbursement contracts;
- facilities contracts; or
- negotiated or sealed bid service contracts performed on a Government installation where the contracting officer determines that the contractor has little direct control over the Government property because it is located on a Government installation and is subject to accessibility by personnel other than the contractor's employees and that by placing the risk on the contractor, the cost of the contract would be substantially increased.

When justified by the circumstances, the contract may require the contractor to assume greater liability for loss of or damage to Government property than that contemplated by the Government property clauses. For example, this may be the case when the contractor is using Government property primarily for commercial work rather than Government work.

Under certain conditions subcontractors are liable for loss of or damage to Government property furnished through a prime contractor.

A prime contractor that provides Government property to a subcontractor should not be relieved of any responsibility to the Government that the prime contractor may have under the terms of the prime contract.

Allowable Costs

Cost is allowable only when the cost complies with all of the following requirements:

- Reasonableness.
- Allocability.
- Standards promulgated by the CAS Board, if applicable. (Otherwise, use generally accepted accounting principles and practices appropriate to the circumstances.)
- Terms of the contract.
- Any limitations set forth in 48 CFR 31.

Certain cost principles in 48 CFR 31 incorporate the measurement, assignment, and allocability rules of selected CAS and limit the allowability of costs to the amounts determined using the criteria in those selected standards. Only those CAS or portions of standards specifically made applicable by the cost principles in this part are mandatory unless the contract is CAS covered. Business units that are not otherwise subject to these standards under a CAS clause are subject to the selected standards only for the purpose of determining allowability of costs on Government contracts. Including the selected standards in the cost principles does not subject the business unit to any other CAS rules and regulations. The applicability of the CAS rules and regulations is determined by the CAS clause, if any in the contract, and the requirements of the standards themselves.

When contractor accounting practices are inconsistent with 48 CFR 31.201, costs resulting from such inconsistent practices in excess of the amount that would have resulted from using practices consistent with this subpart are unallowable.

A contractor is responsible for accounting for costs appropriately and for maintaining records, including supporting documentation, adequate to demonstrate that costs claimed have been incurred, are allocable to the contract, and comply with applicable cost principles in this subpart and agency supplements. The contracting officer may disallow all or part of a claimed cost that is inadequately supported.

Non-Allowable Costs (Unallowable Costs)

Costs that are expressly unallowable or mutually agreed to be unallowable, including mutually agreed to be unallowable directly associated costs, should be identified and excluded from any billing, claim, or proposal applicable to a Government contract. A directly associated cost is any cost which is generated solely as a result of incurring another cost, and which would not have been incurred had the other cost not been incurred. When an unallowable cost is incurred, its directly associated costs are also unallowable.

Costs that specifically become designated as unallowable or as unallowable directly associated costs as a result of a written decision furnished by a contracting officer should be identified if included in or used in computing any billing, claim, or proposal applicable to a

Government contract. This identification requirement applies also to any costs incurred for the same purpose under like circumstances as the costs specifically identified as unallowable under either this paragraph or the preceding paragraph.

If a directly associated cost is included in a cost pool which is allocated over a base that includes the unallowable cost with which it is associated, the directly associated cost should remain in the cost pool. Since the unallowable costs will attract their allocable share of costs from the cost pool, no further action is required to assure disallowance of the directly associated costs. In all other cases, the directly associated costs, if material in amount, must be purged from the cost pool as unallowable costs.

The practices for accounting for and presentation of unallowable costs will be those as described in 48 CFR 9904.405, "Accounting for Unallowable Costs," and 48 CFR 9905.505, for education institutions.

References: 48 CFR 901-970
48 CFR 31

Discuss the technical oversight and qualifications required to assess contractor performance and the training of contractor employees.

DOE P 226.1, *Department of Energy Oversight Policy*, establishes a Department-wide oversight process to protect the public, workers, environment, and national security assets and to perform its business operations effectively through continuous improvement. To meet this goal, all DOE organizations must implement an assurance system that ensures compliance with applicable requirements, pursues excellence through continuous improvement, provides for timely identification and correction of deficient conditions, and verifies the effectiveness of completed corrective actions. Additionally, DOE oversight programs must determine whether programs, management systems, and assurance systems comply with requirements and are effectively implemented.

It is DOE policy to implement assurance systems and oversight programs that include four essential elements:

1. A comprehensive and rigorous assurance system at all sites implemented by the contractor (for Government-owned, contractor-operated sites) and Federal organizations (for Government-owned, Government-operated sites) that manage or operate on a DOE site
2. DOE field element line management oversight processes, such as inspections, reviews, surveillances, surveys, operational awareness, and walkthroughs, that evaluate programs and management systems and the validity of the site assurance system
3. DOE Headquarters line management oversight processes that are focused on the DOE field elements and also look at contractor activities to evaluate the implementation and effectiveness of field element line management oversight
4. Independent oversight processes that are performed by DOE organizations that do not have line management responsibility for the management of the activity and thus provide an independent perspective for senior management on the effectiveness of programs and activities at all organizational levels (HQ, field, and contractor)

Personnel responsible for managing and performing assurance and oversight functions will possess experience, knowledge, skills, and abilities commensurate with their responsibilities. Line managers are responsible for ensuring that personnel with oversight responsibilities meet applicable qualifications standards. Continuing training and professional development activities are encouraged to supplement individual experience and provide a means to maintain awareness of changes and advances in the various fields of expertise.

DOE O 226.1, *Implementation of Department of Energy Oversight Policy*, states that it is the responsibility of the Administrator, NNSA; cognizant Secretarial Officers; DOE and NNSA procurement executives; and program Secretarial Officers to establish and maintain appropriate qualification standards for personnel with HQ and field oversight responsibilities and clear, unambiguous lines of authority and responsibility for oversight. It also states that it is the responsibility of the heads of field organizations/heads of contracting activities to maintain appropriate qualification standards for personnel with oversight responsibilities and clear, unambiguous lines of authority and responsibility for oversight.

The contractor is required to ensure that personnel who manage and perform assurance functions possess experience, knowledge, skills, and abilities commensurate with their responsibilities. The contractor must establish and maintain appropriate qualification standards for personnel with oversight responsibilities.

DOE line management must implement oversight processes that include assessments that review site qualification standard programs, training programs, and individual training and qualifications as they relate to environment, safety, and health; safeguards and security; emergency management; cyber security; and business practices.

Independent evaluators will be appropriately trained and qualified and have knowledge of the areas assessed.

DOE Order 5480.20A, *Personnel Selection, Qualification and Training Requirements for DOE Nuclear Facilities*, requires DOE to perform periodic systematic evaluations of contractor training and qualification programs using DOE-STD-1070-94 and provide day-to-day oversight of nuclear facility personnel training and qualification activities.

DOE-STD-1070-94, *Guidelines for Evaluation of Nuclear Facility Training Programs*, states that each evaluator's experience should be commensurate with individually assigned objectives and criteria. Before beginning the evaluation the evaluator(s) should be trained in evaluation methodology and should be familiar with the objectives and criteria that they are assigned to evaluate.

The training program objectives and criteria contained in DOE-STD-1070-94 are not a substitute for the evaluator's technical knowledge of the facility or program. The evaluation must be performed using personnel who have a technical background (e.g., nuclear facility operations, maintenance, and radiological protection personnel, and/or expertise in tritium, plutonium, or other subjects) in the subject area(s) being evaluated. If a group of individuals is performing the evaluation, the team should be made up of an appropriate balance of personnel with training and technical backgrounds. The optimum situation is to use personnel with a technical background and experience in training design, development, and

management. If the evaluation is conducted by someone who does not have the specific technical qualifications, the results should be reviewed by a subject matter expert with expertise in the subject area(s) before the evaluation is forwarded to the management and operating contractor. Techniques for assessing performance are available in DOE G 120.1-5.

d. Discuss the fee-based evaluation process, including the development of performance criteria, conduct of the evaluation, and documentation and transmittal requirements for performance.

The stated objective of NNSA Policy Letter NAP-4A, Corporate Performance Evaluation Process for Management and Operating Contractors, reads as follows:

> To establish and implement a uniform, corporate process for evaluation of NNSA Management and Operating (M&O) contractors' performance that promotes effective and efficient accomplishment of the NNSA mission and results in documented, consistent, and fair evaluation of results while minimizing the administrative burden from Headquarters involvement.

Through NAP-4A, the fee-based evaluation processes, performance criteria, conduct of the evaluation, and documentation and transmittal requirements are outlined.

Fee-Based Evaluation Process

Before a fee-based evaluation process can begin, it must be planned. The planning process identifies the criteria, discussed below, to which the evaluation will apply, so that specific performance measures can be established, agreed upon, then analyzed. From this analysis the level of proficiency to those measures is achieved. This is done through a Performance Evaluation Plan (PEP). The PEP development and negotiation process is described in NAP-4A. Under the letter's requirements, the following is stated:

> The Contractor Performance Evaluation Process will be an "NNSA-corporate," integrated process applied consistently by all NNSA sites. The corporate process may be updated periodically to reflect changes and lessons learned.

The PEP for each site will follow the format and boundaries found in the letter, which continues its discussion with the following:

> The Fee Determining Official (FDO) will review and approve where appropriate, the fee rate or amount of available fee for each PEP, based on the recommendation of the Site Office Manager and Management Council.
>
> At a high level, the evaluation process is divided into three phases for NNSA M&O Contracts:
>
> 1. The Planning Phase precedes the execution year (generally a Government fiscal year) and includes:
>   - Review and incorporation of lessons learned from the past year

- Identification of performance metrics consistent with the Planning, Programming, Budgeting and Execution/Evaluation (PPBE/E) process
- Development, review and approval of PEPs for each NNSA M&O contract.
- Determination of the amount of fee to be available and allocated within the PEP.

2. The Monitoring Phase takes place during the execution year and includes:
   - Monitoring of contractor performance—operational awareness an evaluation of results during the execution year, supported by appropriate documentation
   - Linkage of evaluation activities to the PPBE/E process
   - Periodic reporting of performance results to appropriate NNSA management.
3. The Assessment Phase begins after the execution year has ended and should be completed before interest penalties are assessed on late payment of fee, if applicable.
   - Site Offices, with input from program offices, functional offices and non-NNSA offices, as applicable, will validate contractor performance and provide recommended ratings and/or recommended earned fee amount to the Management Council and, in turn, NA-1 (FDO). Timely and effective Headquarters input is critical to a successful Assessment Phase.
   - After Management Council review, NA-1 will determine the final performance rating and earned fee for the contractors.
   - The FDO has the discretion to adjust the recommended rating or earn fee within the available fee pool. The adjustment should generally be within the range of plus or minus 5 percent. The rationale for a management adjustment to an otherwise earned fee amount or rating total outside the range of plus or minus 5 percent will be included in the Site Office Manager's letter to the contractor that transmits the final Performance Evaluation Report (PER).

As found in 48 CFR 970.1504–1 and –2 *Fee Policy*:

(a) DOE management and operating contractors may be paid a fee in accordance with the requirements of this subsection.
(b) There are three basic principles underlying the Department's fee policy:
   (1) The amount of available fee should reflect the financial risk assumed by the contractor.
   (2) It is the policy of the Department, when work elements cannot be fixed price, incentive fees (including award fees) tied to objective measures should be used to the maximum extent appropriate.

(3) When work elements cannot be fixed price and award fees are employed, they should be tied to either objective or subjective measures. Each measure should, to the maximum extent appropriate, be directly tied to a specific portion of the fee pool.

(c) Fee objectives and amounts are to be determined for each contract. Standard fees or across-the-board fee agreements will not be used or made. Due to the nature of funding management and operating contracts, it is anticipated that fee shall be established in accordance with the annual funding cycle; however, with the prior approval of the Procurement Executive, or designee, a longer period may be used where necessary to incentivize performance objectives that span funding cycles or to optimize cost reduction efforts.

(d) Annual fee amounts shall be established in accordance with this subsection. Annual amounts shall not exceed maximum amounts derived from the appropriate fee schedule (and Classification Factor, if applicable) unless approved in advance by the Procurement Executive, or designee. In no event shall any fee exceed statutory limits imposed by 41 U.S.C. 254(b).

(e) (1) Contracting Officers shall include negative fee incentives in contracts when appropriate. A negative fee incentive is one in which the contractor will not be paid the full target fee amount when the actual performance level falls below the target level established in the contract.

(2) Negative fee incentives may only be used when:

(i) A target level of performance can be established, which the contractor can reasonably be expected to reach;

(ii) The value of the negative incentive is commensurate with the lower level of performance and any additional administrative costs;

(iii) Factors likely to prevent attainment of the target level of performance are clearly within the control of the contractor; and

(iv) The contract indicates clearly a level below which performance is not acceptable.

It is here in 48 CFR 970.1504 (e)(1) and (e)(2) that the concept of target performance levels (criteria) is established, and the related "negative fee" based on an unacceptable performance level. The results of the evaluation correlate directly with the loss of fee that would have been awarded had the performance levels met pre-established criteria. The failure to perform is documented and transmitted to the DOE M&O contractor upon the evaluation's finalization. Contract clauses in M&O contracts spell out expectations and requirements for this process and related consequences regarding the award of fee

Development of Performance Criteria

The development of performance criteria begins with a survey of contract requirements to identify specific, tangible actions, performance measures, and other measurable means. DOE

NAP-4A-1 provides the following definitions for PEPs, which are helpful in establishing performance criteria:

- Performance Objective: A statement of desired results for an organization or activity.
- Performance Measure: A quantitative or qualitative method for characterizing performance.
- Performance Target: The desired condition or target level of achievement for each measure, established at an appropriately detailed level that can be tracked and used for a judgment or decision on performance assessment.

An example of a performance objective, measure, and target for a site might be conveyed as follows:

- Performance Objective: Provide effective management of facility space.
- Performance Measure: Reduction of the site's facility footprint.
- Performance Target: Reduce facility footprint by 10% within budgeted cost and schedule.

Metrics gauging the level at which each of these criteria provide valuable input to an overall assessment of an organization's performance. DOE G 120.1-5 provides guidance on choosing metrics and other performance measures.

Conduct of the Evaluation

The evaluation of a contractor's performance should be conducted with full involvement from the contractor's executive management. Sufficient notice should be provided to the contractor, along with the scope and criteria of the evaluation to allow the contractor to adequately prepare. Additionally, periodic (quarterly or semi-annual) monitoring reviews (joint M&O and Site Office personnel) provide continuous assessment of the contractor's performance in comparison to the PEP.

Documentation and Transmittal Requirements for Performance

The results (positive or negative) of the fee-based evaluation must be documented and transmitted through the PER to the contractor as soon as the results are finalized. Areas of deficiency must be identified, and adjustments to performance measures must be developed and monitored to ensure improved fulfillment of contract requirements. Any modification to these measures will become part of the following year's contract requirements, as an evolutionary process. Contract clauses found in M&O contracts outline site-specific requirements related to this process, and should be reviewed on a site-specific basis.

e. Identify who can make contractual requests or approvals of contract provisions, and the qualifications required of that individual(s).

The field management branch negotiates and administers all contracts assigned to DOE/NNSA. The contracting officer or an authorized delegate possesses the authority to make contractual requests and to approve contract provisions. Qualifications for this position include experience in performing the following activities:

- Pre-solicitation planning
- Contractor selection
- Negotiation
- Instrument preparation

- Appropriate coordination
- Ongoing administration, including fee administration
- Instrument termination, close-out, and contractor purchasing system reviews
- Environmental and program-management-related MOUs and program-related interagency agreements with other Government organizations and similarly related cooperative agreements with the states, Indian tribes, and companies associated with assigned projects/programs

References: 48 CFR 970

f. Discuss the intent of the revised DEAR Clause 970.5223-1 regarding environment, safety, and health, (ES&H) and the impact of contract reform on ES&H.

Recent DEAR changes strengthened the administration and oversight of performance-based management contracts. One focus area is ES&H performance. Specifically, DEAR clause 970.5223-1, "Integration of ES&H into Work Planning and Execution," strengthens contractor accountability for ES&H performance by requiring the integration of ES&H into business systems and work management processes. Further, the clause delineates basic ES&H system requirements for all DOE operating contractors in order to help ensure work is conducted safely.

As set forth in DEAR 970.5223-1, a safety management system description must be submitted to and approved by the contracting officer. In the process, the conditions and requirements within the safety management system description become requirements of the contract and binding on the contractor. The Department expects that each facility or site will tailor the safety management system commensurate with the work to be accomplished and the associated hazards.

The clause also states that before work is performed, the associated hazards need to be evaluated, and an agreed-upon set of ES&H standards and requirements need to be established that will provide adequate assurance that employees, the public, and the environment are protected from adverse consequences.

The contractor should, in the performance of work, ensure the following:

- Line management is responsible for the protection of employees, the public, and the environment. Line management includes those contractor and subcontractor employees managing or supervising employees performing work.
- Clear and unambiguous lines of authority and responsibility for ensuring ES&H functions and activities are established and maintained at all organizational levels.
- Personnel possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities.
- Resources are effectively allocated to address ES&H, programmatic, and operational considerations. Protecting employees, the public, and the environment is a priority whenever activities are planned and performed.
- Before work is performed, the associated hazards are evaluated and an agreed-upon set of ES&H standards and requirements are established that, if properly implemented, provide adequate assurance that employees, the public, and the environment are protected from adverse consequences.

- Administrative and engineering controls to prevent and mitigate hazards are tailored to the work being performed and associated hazards. Emphasis should be on designing the work and/or controls to reduce or eliminate the hazards and to prevent accidents and unplanned releases and exposures.
- The conditions and requirements to be satisfied for operations to be initiated and conducted are established and agreed-upon by DOE and the contractor. These agreed-upon conditions and requirements are requirements of the contract and binding upon the contractor. The extent of documentation and level of authority for agreement should be tailored to the complexity and hazards associated with the work, and should be established in a safety management system.

The impact of these revisions are clearly a strengthening of DOE's commitment regarding the environment and the safety and health of workers and the public.

g. Participate on a team reviewing the contractor's subcontracting practices.

Note: This element is performance based. The Qualifying Official will evaluate its completion.

20. An STSM shall demonstrate the ability to effectively manage programs and projects utilizing the processes and procedures necessary to ensure the safety of departmental activities, including some knowledge of the mission and key programs.

a. Discuss the Department's policy for planning, programming, budgeting, and acquisition of capital assets as described in DOE P 413.1, Program and Project Management Policy for the Planning, Programming, Budgeting, and Acquisition of Capital Assets.

Federal program and project managers are accountable for the planning, programming, budgeting, and acquisition of capital assets. The principal DOE goal is to deliver capital assets on schedule, within budget, and fully capable of meeting mission performance and environmental, safety, and health standards. DOE Federal program and project managers are responsible for ensuring that capital asset projects are managed with integrity and in compliance with applicable laws. Major DOE objectives include obtaining quality products, ensuring timeliness of performance, controlling cost, and mitigating adverse events. To achieve these goals, Federal program and project managers should assemble an integrated team, which includes other DOE functional areas such as budget, financial, legal, safety, and contracting areas, to assist them with the planning, programming, budgeting, and acquisition of capital assets.

DOE Federal managers will

- justify budgets needed for acquisition of capital assets;
- ensure line management involvement in, and accountability for project performance;
- establish and maintain strong project management organizations and systems;
- use appropriate project management tools and train personnel;
- develop and implement programs for institutionalizing project management capabilities.

b. Define the following terms:

- **Baseline;**
- **Graded approach;**
- **Infrastructure;**
- **Life cycle; and**
- **Programmatic management;**
- **Metrics and performance measures**

Baseline

A baseline is the initial quantitative expression of projected costs, schedule, and technical requirements: the established plan against which the status of resources and the progress of a project can be measured.

Graded Approach

A graded approach is the depth of detail required and the magnitude of resources expended for a particular management element to be tailored, commensurate with the element's relative importance to safety, environmental compliance, safeguards and security, programmatic importance, magnitude of the hazard, financial impact, and/or other facility-specific requirements.

Infrastructure

Infrastructure is all real property and installed equipment and personal property that are not solely supporting a single program mission.

Life Cycle

Life cycle is the life of an asset from planning through acquisition, maintenance, operation, and disposition.

Programmatic Management

Programmatic management consists of functions that include planning and developing the overall program; establishing broad priorities; providing program technical direction; preparing and defending the program budget; controlling milestones; integrating all components of the program; providing public and private sector policy liaison; expediting interface activities and follow-up actions; and retaining overall accountability for program success.

Metrics and Performance Measures

Metrics and performance measures are any evaluation, comparison, or judgment toward meeting an objective.

References: DOE G 120.1-5
DOE O 226.1

c. Describe the key elements of supervising/monitoring program activities and contractors.

Key elements of a robust supervisory or monitoring program include

- an established baseline,
- published performance criteria against which to compare actual program activities,

- a valued and effective interface with the contractor, and
- feedback mechanisms to ensure issues are identified and appropriately managed and resolved.

References: DOE G 120.1-5

d. Describe the purpose of schedules, and discuss the use of milestones and activities.

Schedules and milestones provide a chronological perspective of performance expectation. They may be acceptable measures when accompanied by an assessment of an organization's ability to meet those expectations.

Critical milestones provide the key tasks and target dates representing broad events required to correct the problem, root cause(s), and systemic deficiencies. All critical milestones should list an original target completion date. This is the date included in the original action plan as the proposed completion of the milestone and should stay the same through closure. A revised target or actual completion date should be listed if

- the milestone target completion date has been revised, in which case the most current date should be listed; and/or
- the milestone has been completed, in which case the completion date should be listed.

References: DOE O 226.1

e. Define and compare the terms cost estimate and budget.

Cost Estimate

As found in DOE G 430.1-1, "cost estimate" is defined as

> A cost estimate is a statement of costs estimated to be incurred in the conduct of an activity, such as a program, or the acquisition of a project or system. The estimate can be in the form of proposals by contractors or Government agencies, a response to a program opportunity notice, or a DOE estimate.

Budget

As found in the GAO-05-734SP Budget Glossary, budget is defined as "A detailed statement of anticipated revenues and expenditures during an account period."

Comparing the two terms is a matter of understanding that cost estimates may exceed funds allocated to a given project, leading to revision of the scope of work to accommodate any possible shortfall, so that work performed aligns directly with funding available to accomplish the project.

f. Describe the process for preparing cost estimates and budgets.

Cost Estimates

The techniques used for preparing cost estimates will necessarily vary with the project's phase of acquisition and degree of definition; the state-of-the-art of the project; the

availability of data bases, cost-estimating techniques, time, and cost estimators; and the level of detail or work breakdown structure required in the estimates. A study of the item or task, in light of the degree of estimating difficulty, should indicate the method or combination of methods to be used in estimating the cost of that particular item or task, as follows:

- Bottom-up Technique. Generally, a work statement and set of drawings or specifications are used to "takeoff" material quantities required to perform each discrete task performed in accomplishing a given operation or producing an equipment component. From these quantities, direct labor, equipment, and overhead costs are derived and added thereto.
- Specific Analogy Technique. Specific analogies depend upon the known cost of an item used in prior systems as the basis for the cost of a similar item in a new system. Adjustments are made to known costs to account for differences in relative complexities of performance, design, and operational characteristics.
- Parametric Technique. Parametric estimating requires historical data bases on similar systems or subsystems. Statistical analysis is performed on the data to find correlations between cost drivers and other system parameters, such as design or performance parameters. The analysis produces cost equations or cost-estimating relationships, which can be used individually or grouped into more complex models.
- Cost Review and Update Technique. An estimate is constructed by examining previous estimates of the same project for internal logic, completeness of scope, assumptions, and estimating methodology.
- Trend Analysis Technique. A contractor efficiency index is derived by comparing originally projected contract costs against actual costs on work performed to date. The index is used to adjust the cost estimate of work not yet completed.
- Expert Opinion Technique. This technique may be used when other techniques or data are not available. Several specialists can be consulted reiteratively until a consensus cost estimate is established.

Cost estimates can be developed for many purposes: comparative studies, trade-off studies, funding decisions, program changes, cost-benefit analyses, procurement support, and for independent review or analysis of another estimate for a test of reasonableness. Cost estimates will include all relevant costs depending on the purpose of the estimate (e.g., total life-cycle costs or components thereof, such as research, development, production, and operating, support, and decommissioning costs, as appropriate).

Budget

Providing adequate resources to develop, acquire, and operate a project is first a design constraint and second a determination of the Department's planning and budgeting process. The budget decisions should be consistent with project baseline decisions derived from requirements contained in the project management system. Integration of decisions concerning project resource availability in the planning and budgeting process involves the following procedures:

- Field Budget Call. A field budget call should be issued by the chief financial officer in mid- to late January, incorporating any budget planning decisions that have been made by the Secretariat. Prior to including a project in the budget, a conceptual design should be completed. Also, any planned conceptual designs that are expected to exceed $1 million should be completed and submitted to HQ. Project data sheets

should be developed and submitted for new project efforts and ongoing project efforts that require additional funding. This documentation and the conceptual design report should be used to validate the project and to defend the project in the internal review budget.

- Project Validation. Shortly after the field call is issued, the Office of Program/Project Management should issue procedures and a checklist to be used with the information received in the field budget submission to conduct project validations. In April and May, the Office of Program/Project Management, in coordination with the program offices, should assess new projects over $5 million and ongoing projects requesting additional funding. The validation process evaluates the projects for readiness to proceed into the Department's budget process, and examines the planning, development, and baseline of a project to ensure that the funds requested are commensurate with the project's anticipated scope and schedule. Normally, the project must be validated prior to inclusion in the internal review budget.
- Internal Review, OMB, and Congressional Budgets. Project documentation should be updated according to decisions made in each review. The conceptual design report, justification of mission need, and project data sheet are the mainline documents used to defend the project within the Department. Outside DOE (i.e., OMB and Congress), only the project data sheet is used. Therefore, it is vital that the document be accurate and up-to-date for each review.
- Field Work Package Proposal and Authorization System. Specific DOE contractors, primarily management and operations contractors, process their budget submissions through the use of the WPPAS. The major emphasis of WPPAS is to group associated research and development tasks and activities into work packages for the purpose of DOE approval and control. A work package might include several project-related efforts grouped by objectives and technical discipline. Each work package should be measurable in terms of performance, and include sufficient specifications of verifiable events or deliverables to mark project achievement.

References: DOE O 130.1

g. Define and explain the relationship between the following terms:
- **Budgeted cost of work scheduled (BCWS);**
- **Budgeted cost of work performed (BCWP); and**
- **Actual cost of work performed (ACWP).**

DOE M 413.3-1 provides the following definitions.

"Budgeted cost of work scheduled" is defined as

> The sum of the budgets for all work (work packages, planning packages, etc.) scheduled to be accomplished (including in-process work packages), plus the amount of level of effort and apportioned effort scheduled to be accomplished within a given time period.

"Budgeted cost of work performed" is defined as

> A measure of work completed (in Earned Value Management terminology). BCWP is the value of work performed, or "earned" when compared to the original plan, that is the Budgeted Cost of Work Scheduled. The BCWP is called the Earned Value.

"Actual cost of work performed" is defined as

> Total costs incurred (direct and indirect) in accomplishing an identified element or scope of work during a given time period

The relationship between the terms lies in the sequencing of events, in the order shown in the element. The first step is to establish the cost of work scheduled, followed by comparison of the cost of work performed against what was scheduled. The actual cost of work performed is the final determination of whether the project has been properly executed and performance has been properly managed.

h. Discuss how priorities should be balanced to achieve the following:
- **Resources are effectively allocated to address safety, programmatic, and operational considerations; and**
- **Protecting the public, the workers, and the environment is a priority whenever activities are planned and performed.**

Within the seven guiding principles of ISM, there is direction given on balancing priorities. As found in 10 CFR 851, "Supplemental Information," section II, "Legal Authority and Relationship to Other Regulatory Programs":

- Balanced priorities. Resources must be effectively allocated to address safety, programmatic, and operational considerations. Protecting the public, the workers, and the environment must be a priority whenever activities are planned and performed.
- Identification of safety standards and requirements. Before work is performed, the associated hazards must be evaluated and an agreed-upon set of safety standards and requirements must be established which, if properly implemented, will provide adequate assurance that the public, the workers, and the environment are protected from adverse consequences.
- Hazard control tailored to work being performed. Administrative and engineering controls to prevent and mitigate hazards must be tailored to the work being performed and the associated hazards.

Therefore, the primary purpose of setting and balancing priorities is to ensure program success, but not at the expense of the safety of the public, the workers, or the environment. This is a fundamental feature of properly planning a project, and as hazards and risks are identified, they must be addressed and mitigated based on resource allocation as required.

i. Discuss DOE's budgeting process to capture funding decisions based on prioritization of work.

DOE O 413.1A, *Management Control Program*, states that budget formulation represents the initial stage of the budget process in which data is developed; annual estimates of funding requirements are prepared; detailed analysis and reviews are performed; budget data is consolidated and summarized; detailed justification is developed, including prioritizing requirements; presentations are provided to internal and external reviewing and approving authorities; and budget changes are controlled and communicated throughout the organization.

DOE M 450.4-1 provides examples of inherently Federal non-operational work activities that are required for the overall Department-wide ISM system to be effective, and to integrate safety effectively into operational work accomplished in the Department's facilities. One example is prioritizing major projects and work-scopes, and allocating resources to ensure that work and safety are integrated and sufficient resources are available to conduct work safely.

Continuing core expectation CCE-5 states that contractor and DOE budget processes ensure priorities are balanced. Budget development and change control processes ensure that safety is balanced with production. Facility procedures ensure that production is balanced with safety.

j. Discuss the requirements to procure external products and services for DOE projects.

The procurement process should ensure that items and/or services provided by suppliers meet the requirements and expectations of the end-user. The procurement process should be planned and controlled to ensure that the end-user's requirements are accurately, completely, and clearly communicated to the supplier; supplier, designer, and end-user requirements are met during the production phase; and the proper product is delivered on time and maintained until use. The selection of procurement requirements should be commensurate with the importance of the purchased items or services. Management controls exist for DOE procurement and subcontracts through applicable DOE Orders, the DEAR in 48 CFR chapter 9, and FAR in 48 CFR parts 1 to 99.

The procurement process of DOE nuclear facility contractors should include a determination of the applicability of 10 CFR 830 to the supplier or subcontractor. If applicable, procurement documents and contracts for items and services provided to facilities covered by 10 CFR 830 should include a statement informing the supplier or subcontractor that they are subject to 10 CFR 830 and the enforcement actions under 10 CFR 820. Suppliers and subcontractors are not required by 10 CFR 830 to submit their quality assurance programs to DOE for review and approval; rather, it is left to the contractor to determine the methods for ensuring that procured items and services meet requirements and perform as expected.

k. Describe the methods for procuring DOE or other Government products and services.

The Federal Supply Schedule program is also known as the GSA Schedules Program or the Multiple Award Schedule Program. The Federal Supply Schedule program is directed and managed by GSA and provides Federal agencies with a simplified process for obtaining commercial supplies and services at prices associated with volume buying. Indefinite delivery contracts are awarded to provide supplies and services at stated prices for given periods of time. GSA may delegate certain responsibilities to other agencies (e.g., GSA has delegated authority to the Veteran's Administration to procure medical supplies under the Veterans Administration Federal Supply Schedules program).

Other procurement vehicles include direct contracting with vendors, and Government-issued credit cards, both of which have dollar limitations associated with their use.

Additional information is available in the Federal Acquisition Regulations, part 8, at http://www.arnet.gov/far/.

References: 48 CFR 900–970

l. Explain what is meant by "Make-or-Buy" in procuring products or services.

"Make or buy" is a decision-making process that compares the cost of using resources presently owned to make (fabricate) the required product or provide the required service, with the cost of purchasing the product or service from a vendor or supplier.

Title 48 CFR 970.5215-2 provides a definition, first of the separate terms, then as "make-or-buy plan," shown here:

> "Buy item" means a work activity, supply, or service to be produced or performed by an outside source, including a subcontractor or an affiliate, subsidiary, or division of the contractor.
>
> "Make item" means a work activity, supply or service to be produced or performed by the contractor using its personnel and other resources at the Department of Energy facility or site.
>
> Make-or-Buy Plan. The contractor shall develop and implement a make-or-buy plan that establishes a preference for providing supplies and services on a least-cost basis, subject to any specific make or buy criteria identified in the contract or otherwise provided by the contracting officer. In developing and implementing its make-or-buy plan, the contractor agrees to assess subcontracting opportunities and implement subcontracting decisions in accordance with the following:
>
> 1. The contractor shall conduct internal productivity improvement and cost-reduction programs so that in-house performance can be made more efficient and cost-effective.

2. The contractor shall consider subcontracting opportunities with the maximum practical regard for open communications with potentially affected employees and their representatives. Similarly, a contractor shall communicate its plans, activities, cost-benefit analyses, and decisions to those stakeholders, including representatives of the community and local businesses, likely to be affected by such actions.

m. Discuss the Davis-Bacon Act as it relates to DOE financial management issues.

The Davis-Bacon Act, as amended, requires that each contract over $2,000 to which the United States or the District of Columbia is a party for the construction, alteration, or repair of public buildings or public works shall contain a clause setting forth the minimum wages to be paid to various classes of laborers and mechanics employed under the contract. Under the provisions of the Act, contractors or their subcontractors are to pay workers employed directly upon the site of the work no less than the locally prevailing wages and fringe benefits paid on projects of a similar character. The Davis-Bacon Act directs the Secretary of Labor to determine such local prevailing wage rates.

References: 40 U.S.C. § 276a
DOE O 350.1

n. Discuss the responsibilities, authorities, and implementation requirements for DOE O 430.1B, Real Property Asset Management, at defense nuclear facilities.

The LPSO and cognizant Secretarial Office are responsible for notifying contracting officers about the site/facility management contracts to which this Order is applicable. Once notified, contracting officers are responsible for incorporating the CRD into affected site/facility management contracts via the laws, regulations, and DOE directives clause of the contracts.

As the laws, regulations, and DOE directives clause of site/facility management contracts states, regardless of the performer of the work, site/facility management contractors with the CRD incorporated into their contracts are responsible for compliance with the requirements of the CRD. Affected site/facility management contractors are responsible for flowing down the requirements of this CRD to subcontracts at any tier to the extent necessary to ensure compliance with the requirements. In doing so, contractors must not unnecessarily or imprudently flow down requirements to subcontracts. That is, contractors will ensure that they and their subcontractors comply with the requirements of this CRD and only incur costs that would be incurred by a prudent person in the conduct of competitive business.

The management of real property assets must take a corporate, holistic, and performance-based approach to real property life-cycle asset management that links real property asset planning, programming, budgeting, and evaluation to program mission projections and performance outcomes. Acquisitions, sustainment, recapitalization, and disposal must be balanced to ensure real property assets are available, utilized, and in a suitable condition to accomplish DOE missions. The DOE Order sets the requirements for the major real property asset management functional components of planning, real estate, acquisition, maintenance and recapitalization, disposition and long-term stewardship, value engineering, and performance goals and measures.

o. Compare and contrast the project manager and program manager qualification requirements at a given office or site.

p. Manage or oversee the performance of a given project or program that has a minimum duration of six months.

Note: Elements o and p are performance based. The Qualifying Official will evaluate their completion.

21. An STSM shall have a working level knowledge of quality assurance policies, programs, and processes.

a. Describe the general requirements, purpose, interrelationships, and importance of DOE O 414.1C; 10 CFR 830, Nuclear Safety Management; 10 CFR 830.120, Quality Assurance; and national or international consensus standards on quality assurance.

The purpose of DOE O 414.1C is

- to ensure DOE products and services meet or exceed customers' expectations;
- to achieve QA for all work based upon the principles
  - that quality is assured and maintained through a single, integrated, effective QA program (i.e., management system);
  - that management support for planning, organization, resources, direction, and control is essential to QA;
  - that performance and quality improvement require thorough, rigorous assessment and corrective action;
  - that workers are responsible for achieving and maintaining quality;
  - that environmental, safety, and health risks and impacts associated with work processes can be minimized while maximizing reliability and performance of work products;
- to establish quality process requirements to be implemented under a QAP for the control of S/CIs, safety issue corrective actions, and safety software.

Each DOE organization must develop and implement a QAP that

- implements QA criteria using a graded approach and describing how the criteria and graded approach are applied;
- uses national or international consensus standards where practicable and consistent with contractual or regulatory requirements (e.g., 10 CFR 830), and identifies the standards used;
- applies additional standards, where practicable and consistent with contractual or regulatory requirements, and as necessary to address unique/specific work activities;
- integrates, where practicable and consistent with contract or regulatory requirements, quality management system requirements as defined in DOE O 414.1C, the S/CI prevention process, the Corrective Action Management Program, and Safety Software Quality Requirements with other quality or management system requirements in DOE directives and external requirements.

Title 10 CFR 830, "Nuclear Safety Management," governs the conduct of DOE contractors, DOE personnel, and other persons conducting activities, including providing items and

services that affect, or may affect, the safety of DOE nuclear facilities. The requirements of this part must be implemented in a manner that provides reasonable assurance of adequate protection of workers, the public, and the environment from adverse consequences, taking into account the work to be performed and the associated hazards.

Title 10 CFR 830, subpart A, "Quality Assurance Requirements," establishes quality assurance requirements for contractors conducting activities, including providing items or services that affect, or may affect, nuclear safety of DOE nuclear facilities. It provides details on QAPs and lists the QA criteria.

The interrelationship between these regulations is their shared primary focus points of quality and safety of operations, and the importance of their implementation to ensure successful program functionality.

National and international consensus standards on quality assurance should be applied to activities when they add an additional level of rigor, thus resulting in a higher level of quality control on the activity. An example of this application is aspiring to "do better than required" and have expectations exceeded, not just met.

b. Describe how ASME NQA-1-2004 is applied to implement the QA criteria.

DOE G 414.1-2A, *Quality Assurance Management System Guide for Use with 10 CFR 830 Subpart A, Quality Assurance Requirements,* and DOE O 414.1C, *Quality Assurance,* states that organizations should identify, document, and use appropriate standards to develop and implement the management system. In certain cases, DOE specifies national standards to be used. For example, DOE O 414.1C specifies the use of NQA-1-2000 for safety software. Clearly defined standards also support SMS principle 5, identification of safety standards and requirements.

DOE O 414.1C requires the use of standards to develop and implement the QAP, and indicates NQA-1-2004 as the appropriate standard for nuclear activity.

For certain high-risk activities, the requirements of ASME NQA-1-2004 may be applied as appropriate, or other standards with similar rigor may be applied. The specific activities and ASME NQA-1-2004 requirements are described in the documents for that activity. The basis for the selection of the standard should be documented and maintained as a record that supports the management decision. The requirements of ASME NQA-1-2004 may be applied utilizing an appropriate graded approach for the procurement activities.

In many cases, the customer specifies the particular standards used. Organizations with multiple customers often develop their management systems using several standards. For example, a single facility may adopt ISO 9001 for corporate reasons, ASME NQA-1-2004 for an EPA/NRC regulation, and DOE quality criterion 1 for nuclear weapons activities. The standards selected should suit the products and services of the organization and its customers.

c. Describe how the QA requirements are related to the Documented Safety Analysis.

Title 10 CFR 830.204, "Documented Safety Analysis," requires that the documented safety analysis for a hazard category 1, 2, or 3 DOE nuclear facility, as appropriate for the complexities and hazards associated with the facility, define the characteristics of the safety management programs necessary to ensure the safe operation of the facility, including (where applicable) quality assurance, procedures, maintenance, personnel training, conduct of operations, emergency preparedness, fire protection, waste management, and radiation protection.

Title 10 CFR 830, subpart A, "Quality Assurance Requirements," establishes quality assurance requirements for a QAP. The QAP requires contractors conducting activities, including providing items or services, that affect, or may affect, the nuclear safety of DOE nuclear facilities to conduct work in accordance with the quality assurance criteria in 10 CFR 830.122.

The contractor responsible for a DOE nuclear facility must

- submit a QAP to DOE for approval and regard the QAP as approved 90 days after submittal, unless it is approved or rejected by DOE at an earlier date;
- modify the QAP as directed by DOE;
- annually submit any changes to the DOE-approved QAP to DOE for approval, and justify in the submittal why the changes continue to satisfy the quality assurance requirements;
- conduct work in accordance with the QAP.

The QAP must

- describe how the quality assurance criteria of 10 CFR 830.122 are satisfied;
- integrate the quality assurance criteria with the safety management system, or describe how the quality assurance criteria apply to the safety management system;
- use voluntary consensus standards in its development and implementation, where practicable and consistent with contractual and regulatory requirements, and identify the standards used;
- describe how the contractor responsible for the nuclear facility ensures that subcontractors and suppliers satisfy the criteria of 10 CFR 830.122.

DOE G 414.1-4, *Safety Software Guide for Use with 10 CFR 830 Subpart A, Quality Assurance Requirements*, *and DOE O 414.1C*, *Quality Assurance*, defines safety system software as software for a nuclear facility that performs a safety function as part of an SSC and is cited in either a DOE-approved documented safety analysis or an approved hazard analysis per DOE P 450.4, *Safety Management System Policy.*.

Grading safety software based on its application enhances implementation of DOE O 414.1C. Safety software grading levels should be described in terms of safety consequence and regulatory compliance. Level A safety software includes safety software applications that meet one or more of the following criteria:

- Software failure could compromise a limiting condition for operation.
- Software failure could cause a reduction in the safety margin for a safety SSC that is cited in the DOE-approved DSA.

- Software failure could cause a reduction in the safety margin for other systems, such as toxic or chemical protection systems, that are cited in either (1) a DOE approved documented safety analysis, or (2) an approved hazard analysis per DOE P 450.1 and the DEAR ISMS clause.
- Software failure could result in nonconservative safety analysis, design, or misclassification of facilities or SSCs.

d. Describe the DOE's and contractor's responsibilities and requirements for implementing a Quality Assurance Program (QAP).

DOE Management

DOE management is responsible for leadership and commitment to quality achievement and improvement within a framework of public, worker, and environmental safety. Management retains the primary responsibility and accountability for the scope and implementation of the management system. However, every individual in the organization is responsible for achieving quality in his or her activities. Senior management should require and cultivate the achievement and improvement of quality at all levels of the organization and ensure that the QAP is understood and implemented.

Contractor

The contractor is responsible for developing a QAP for the work as specified in its contract by applying the quality assurance criteria specified below.

The QAP must
- discuss how the QA criteria will be satisfied;
- use a graded approach to apply the QA criteria;
- describe how the graded approach will be applied;
- integrate and satisfy quality requirements from other sources;
- integrate the QA criteria with the SMS description developed for 48 CFR 970.5204-2, or describe how the QA criteria will be applied to the SMS;
- describe how the QA criteria will be applied to subcontractors.

References: DOE O 414.1C

e. Discuss the role of STSMs with respect to DOE O 414.1C, 10 CFR 830, Nuclear Safety Management and 10 CFR 830 Subpart A, Quality Assurance.

The following are the responsibilities assigned to the STSM:
- Develop, approve, and implement a QAP governing the work of the field, as applicable. Identify the senior management position specifically assigned this responsibility. Submit the QAP to the LPSO for review and concurrence.
- Review and, where delegated authority to do so, approve new and revised QAPs for contractors within his/her purview. QAPs must be reviewed and approved or rejected within 90 days of receipt from the contractor.
- Perform independent assessments of contractor organizations to evaluate the adequacy and implementation of their QAPs. Other suitable methods may be used in combination with independent assessments.

- Perform management and independent assessments to evaluate the adequacy and implementation of their field element QAP and to improve organizational performance. Perform independent assessments of corrective actions taken for safety issues identified by the Office of Oversight to verify effective implementation.
- Prepare a corrective action plan to address safety issues (i.e., quality problems) identified by the Office of Oversight.

f. Describe the 10 quality assurance criteria of DOE O 414.1C and 10 CFR 830 Subpart A which address the following:
- **Management;**
- **Performance; and**
- **Assessment.**

The QAP must address the following management, performance, and assessment criteria:
- Management/Criterion 1, Program
  - Establish an organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing work.
  - Establish management processes, including planning, scheduling, and providing resources for work.

- Management/Criterion 2, Personnel Training and Qualification
  - Train and qualify personnel to be capable of performing assigned work.
  - Provide continuing training to personnel to maintain job proficiency.

- Management/Criterion 3, Quality Improvement
  - Establish and implement processes to detect and prevent quality problems.
  - Identify, control, and correct items, services, and processes that do not meet established requirements.
  - Identify the causes of problems, and include prevention of recurrence as a part of corrective action planning.
  - Review item characteristics, process implementation, and other quality-related information to identify items, services, and processes needing improvement.

- Management/Criterion 4, Documents and Records
  - Prepare, review, approve, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.
  - Specify, prepare, review, approve, and maintain records.

- Performance/Criterion 5, Work Processes
  - Perform work consistent with technical standards, administrative controls, and hazard controls adopted to meet regulatory or contract requirements using approved instructions, procedures, etc.
  - Identify and control items to ensure their proper use.
  - Maintain items to prevent their damage, loss, or deterioration.
  - Calibrate and maintain equipment used for process monitoring or data collection.

- Performance/Criterion 6, Design
  - Design items and processes using sound engineering/scientific principles and appropriate standards.

- Incorporate applicable requirements and design bases in design work and design changes.
- Identify and control design interfaces
- Verify/validate the adequacy of design products using individuals or groups other than those who performed the work.
- Verify/validate work before approval and implementation of the design.

- Performance/Criterion 7, Procurement
  - Procure items and services that meet established requirements and perform as specified.
  - Evaluate and select prospective suppliers on the basis of specified criteria.
  - Establish and implement processes to ensure that approved suppliers continue to provide acceptable items and services.

- Performance/Criterion 8, Inspection and Acceptance Testing
  - Inspect and test specified items, services, and processes using established acceptance and performance criteria.
  - Calibrate and maintain equipment used for inspections and tests.

- Assessment/Criterion 9, Management Assessment
  - Ensure that managers assess their management processes and identify and correct problems that hinder the organization from achieving its objectives.

- Assessment/Criterion 10, Independent Assessment
  - Plan and conduct independent assessments to measure item and service quality and the adequacy of work performance and to promote improvement.
  - Establish sufficient authority and freedom from line management for independent assessment teams.
  - Ensure that persons conducting independent assessments are technically qualified and knowledgeable in the areas to be assessed.

g. Referring to the following DOE Guides supporting DOE O 414.1C and 10 CFR 830 Subpart A, discuss the implementation of an effective QAP.
- **DOE G 414.1-1A, Management and Independent Assessment Guide;**
- **DOE G 414.1-2A, Quality Assurance Management System Guide for Use with 10 CFR 830 Subpart A, Quality Assurance Requirements, and DOE O 414.1C, Quality Assurance;**
- **DOE G 414.1-3, Suspect/Counterfeit Items Guide for Use with 10 CFR 830 Subpart A, Quality Assurance Requirements, and DOE O 414.1B, Quality Assurance; and**
- **DOE G 414.1-4, Safety Software Guide for Use with 10 CFR 830, Subpart A, Quality Assurance Requirements, and DOE O 414.1C, Quality Assurance.**

DOE G 414.1-1A gives information on establishing processes and performing effective assessments in support of DOE policies, regulations, and Orders. Assessments integrated with the management system add value to products and services by providing feedback and linking the management and conduct of work to meaningful improvement actions.

DOE G 414.1-2A provides information on principles, requirements, and practices used to establish and implement an effective QAP or quality management system consistent with the requirements of 10 CFR 830 subpart A and DOE O 414.1C. This guidance includes methods for the interrelated functions and responsibilities of managing, performing, and assessing work. It also incorporates review guidance for use by DOE in evaluating site office or contractor quality management systems for approval (and may also be tailored for use by contractors to review subcontractor QAPs).

DOE G 414.1-3 provides guidance that will assist DOE and its contractors to mitigate the safety threat of S/CIs. It includes techniques that can be used to strengthen controls in the procurement process, thus minimizing the potential for entry of S/CIs to DOE facilities.

DOE G 414.1-4 provides information plus acceptable methods for implementing the safety SQA requirements of DOE O 414.1C, *Quality Assurance*. DOE O 414.1C requirements supplement the QAP requirements of 10 CFR 830, subpart A "Quality Assurance," for DOE nuclear facilities and activities. The safety SQA requirements for DOE and its contractors are necessary to implement effective QA processes and achieve safe nuclear facility operations. The scope of 10 CFR 830, subpart A, encompasses the contractor's conduct of activities as they relate to safety software (items or services). Therefore, the contractor's QAP includes safety software within its scope. DOE O 414.1C establishes the safety software QA requirements to be implemented under 10 CFR 830, subpart A.

h. Describe the scope, purpose, and application of the safety software quality assurance requirements and work practices.

The scope of DOE G 414.1-4 includes software applications that meet safety software definitions as stated in DOE O 414.1C. This includes software applications important to safety that may be included or associated with structures, systems, or components for less than hazard category 3 facilities. Safety software includes safety system software, safety and hazard analysis software and design software, and safety management and administrative control software.

Safety software quality assurance requirements are necessary to ensure that DOE/NNSA safety software in nuclear facilities performs its intended specific functions in relation to SSCs, and that the classification, design, and analysis associated with nuclear facility operations is correct. These requirements complement those of 10 CFR 830, and provide detail for work associated with safety software that is conducted under the nuclear facility QAP compliant with 10 CFR 830.

Work practices involving safety software must be developed and implemented using national or international consensus standards, and must include the following elements:

- Facility design authority involvement in identifying software specification, acquisition, design, development, verification and validation (including inspection and test), configuration management, maintenance, and retirement
- Identification, documentation, and maintenance of safety software inventory
- Establishment of grading levels for safety software and documentation of those grading levels in the QAP

Safety software quality requirements prescribe

- grading SQA requirements based on risk, safety, facility life cycle, complexity, and project quality requirements;
- performing safety reviews of software configuration items that are consistent with DOE nuclear safety rules (10 CFR 830);
- developing procurement controls for acquisition of computer software and hardware;
- applying SQA requirements to software life cycles;
- documenting and tracking customer requirements;
- managing software configuration throughout the life cycle;
- performing verification and validation;
- training personnel in the design, development, use, and evaluation of safety software.

i. Discuss how the approved Quality Assurance Program at a given DOE site office or contractor are applied to safety system design, construction, and operations, and implementation of its Integrated Safety Management System. Address in the report how the 10 QA criteria and the 12 safety management principles/functions are integrated and the approach used, and effectiveness of the flow-down of QA criteria to subcontractors.

Note: This element is site/contractor specific. The Qualifying Official will evaluate the report.

22. An STSM shall have a working level knowledge of radiation protection program requirements described in 10 CFR 835, and a familiarity level of knowledge of the related DOE Orders, Standards, and Guides.

a. Discuss the purpose and objectives of a DOE Radiation Protection Program.

DOE P 441.1, *Radiological Health and Safety Policy*, states

> It is the policy of the Department of Energy to conduct its radiological operations in a manner that ensures the health and safety of all its employees, contractors, and the general public. In achieving this objective, the Department shall ensure that radiation exposures to its workers and the public and releases of radioactivity to the environment are maintained below regulatory limits and deliberate efforts are taken to further reduce exposures and releases as low as reasonably achievable. The Department is fully committed to implementing a radiological control program of the highest quality that consistently reflects this policy.

References: DOE G 441-1–441-13
10 CFR 835

b. Identify and explain the general and unique radiological hazards associated with the following (as applicable to the STSM):

- **Plutonium operations;**
- **Uranium operations;**
- **Tritium operations;**
- **Nuclear explosive operations;**

- **Production/experimental reactors;**
- **Accelerator operations;**
- **Waste handling/processing operations;**
- **Decontamination and decommissioning;**
- **Use of radiation generating devices; and**
- **Environmental restoration activities.**

Plutonium Operations

The major industrial hazard in plutonium facilities is the potential for loss of control of a highly toxic substance, resulting in either the inhalation or ingestion of plutonium or one of its compounds by personnel, or the exposure to excessive radiation from a criticality accident. The possibility of a fire or explosion in a plutonium facility is probably the most serious threat because the consequences of a fire could lead to loss of containment and subsequent disbursement of highly mobile plutonium particulates. In addition, fighting the fire with water to maintain containment could create the potential for a criticality accident and/or loss of containment in the immediate vicinity.

The day-to-day hazards for personnel in plutonium facilities involve exposure to gamma rays, x-rays, and neutrons, as well as possible accumulation of plutonium in the body.

Uranium Operations

The principal industrial hazards associated with uranium are fires, hydrogen generation, generation of oxides of nitrogen, and associated mechanical hazards characteristic of heavy objects, i.e., back injuries from lifting, dropping heavy parts on feet, etc. Hydrogen fluoride and oxides of nitrogen are by-products or reactants of common chemical processes. Hydrogen can be generated by reaction of water with uranium metal, and finely divided uranium or uranium chips with a large surface-area-to-volume ratio can ignite spontaneously.

Tritium Operations

Tritium constitutes a health hazard when personnel are engaged in specific weapon render-safe procedures, when responding to an accident that has occurred in an enclosed space, and during accidents that have occurred in rain, snow, or in a body of water. In its gaseous state, tritium is not absorbed by the skin to any significant degree. The hazardous nature of tritium is due to its ability to combine with other materials. Tritium water vapor is readily absorbed by the body through inhalation and absorption through the skin. The radioactive water that enters the body is chemically identical to ordinary water and is distributed throughout the body tissue. Although it takes a relatively large amount of tritium to be a significant radiation hazard, caution should be taken. Tritium that has plated out on a surface or combined chemically with solid materials is a contact hazard. The human body normally eliminates and renews 50 percent of its water in about 8–12 days.

Nuclear Explosive Operations

Explosives materials, explosives components (additives or adhesives), and materials such as organic solvents used in explosives processing can be toxic when inhaled, ingested, or absorbed through the skin. The most frequently reported effect from working with explosives is a skin rash resulting from skin contact with explosives materials or with solvents and adhesives used with explosives operations.

Detonated nuclear weapons emit large amounts of electromagnetic radiation as visible, infrared, and ultraviolet light. The chief hazards are burns and eye injuries. On clear days, these injuries can occur well beyond blast ranges. The light is so powerful that it can start fires that spread rapidly in the debris left by a blast. The range of thermal effects increases markedly with weapon yield.

There are two types of eye injuries from the thermal radiation of a weapon:

1. Flash blindness is caused by the initial brilliant flash of light produced by the nuclear detonation. More light energy is received on the retina than can be tolerated, but less than is required for irreversible injury. The retina is particularity susceptible to visible and short wavelength infrared light, since this part of the electromagnetic spectrum is focused by the lens on the retina. The result is bleaching of the visual pigments and temporary blindness for up to 40 minutes.
2. A retinal burn resulting in permanent damage from scarring is also caused by the concentration of direct thermal energy on the retina by the lens. It will occur only when the fireball is actually in the individual's field of vision and would be a relatively uncommon injury. Retinal burns, however, may be sustained at considerable distances from the explosion. The apparent size of the fireball, a function of yield and range, will determine the degree and extent of retinal scarring. A scar in the central visual field would be more debilitating. Generally, a limited visual field defect, which will be barely noticeable, is all that is likely to occur.

Production/Experimental Reactors

Nuclear reactors present a hazard to the health and safety of the public because they are subject to accidents such as explosions in which radioactivity could be released to the atmosphere as dust and expose a large population to lethal or injurious radiation. The nuclear reactor generates the nuclear energy for making electricity, and in the process, it also generates radioactivity as a by-product. This radioactivity builds up in the reactor and is even used as fuel in the case of plutonium, which is perhaps the most potent of all radioactive substances.

Accelerator Operations

Several primary beam areas are high-radiation areas during shutdown or maintenance days. The residual radiation level may be greater than 100 mrem per hour in these areas. High levels of ionizing radiation can damage organs and the skin, cause cataracts, and cause cancer.

Waste-Handling/Processing Operations

Different methods of waste management emit a large number of substances, most in small quantities and at extremely low levels. Raised incidence of low-birth-weight births has been related to residence near landfill sites, as has the occurrence of various congenital malformations. There is little evidence for an association of reproductive or developmental effects with proximity to incinerators. Studies of cancer incidence and mortality in populations around landfill sites or incinerators have been equivocal, with varying results for different cancer sites. Many of these studies lack good individual exposure information and data on potential confounders, such as socio-economic status. The inherent latency of diseases and migration of populations are often ignored. Waste management workers have

been shown to have increased incidence of accidents and musculoskeletal problems. The health impacts of new waste management technologies and the increasing use of recycling and composting require assessment and monitoring.

Decontamination and Decommissioning

Potential decontamination hazards include, but are not limited to, the following:

- Incompatibility between decontaminating agents and contaminants
- Incompatibility between decontaminating agents and clothing or equipment being decontaminated
- Potential effects of inclement weather (e.g., using wet procedures during cold weather can cause operational and maintenance problems)
- Potential effects of hazards on worker health and safety (e.g., vapors from chemical decontamination solutions may be hazardous on inhalation or contact with skin, or may be flammable)
- Generation of airborne contaminants from improper use of equipment (e.g., jet sprayers, vacuum cleaners)

Stringent regulatory controls protect the public, the environment, and workers from the hazards associated with nuclear facilities. These hazards arise from the radioactive inventory of the facility and from the nature of the operations carried out. When a facility is shut down because of age, redundancy, or breakdown, the hazards associated with operational activities are generally eliminated or substantially reduced, but those associated with the radioactive inventory remain, and tight regulation is still required.

Use of Radiation-Generating Devices

The use of radiation-generating devices could result in internal or external dose to workers; contamination of workers, work areas, equipment, or facility systems; or release of radioactive material to the environment. The risk from occupational radiation dose depends on the amount of radiation dose received, the time over which the dose is received, and the parts of the body exposed. Acute exposure occurs when a radiation dose is delivered in a short period of time — from seconds to days. Chronic exposure occurs when a radiation dose is spread out over an extended period of time — usually months to years. Normally, a chronic dose is less harmful than an acute dose because the body has an opportunity to repair cellular damage. There is substantial scientific evidence that humans exposed to acute, high doses of radiation may exhibit adverse health effects (acute radiation syndrome or an increased risk of cancer). Below an acute dose of 10 rem, health effects are either too small to be observed or nonexistent.

Environmental Restoration Activities

The hazards faced during environmental restoration operations are primarily worker safety related, and the OSHA regulations in 29 CFR 1910.120 and 29 CFR 1926.65 are aimed primarily at protecting the workers. Therefore, use of the OSHA requirements was made an acceptable alternative for meeting the nuclear safety rules.

All suspected conditions that may pose inhalation or skin absorption hazards that are immediately dangerous to life or health, or other conditions that may cause death or serious harm, should be identified during the preliminary survey and evaluated during the detailed

survey. Examples of such hazards include confined space entry, potentially explosive or flammable situations, visible vapor clouds, or areas where biological indicators such as dead animals or vegetation are located.

References: DOE O 452.1C

c. Discuss how the radiation protection program is related to the nuclear safety basis (and Documented Safety Analysis) for the STSM's cognizant facility(s) and activities.

Note: This element is facility specific. The Qualifying Official will evaluate the discussion.

d. Identify and discuss the required elements of a radiation protection program, including the requirements for internal audits.

The functional elements of an RPP are

- organization and administration
- an ALARA program
- external dosimetry
- internal dosimetry
- area monitoring and control
- radiological controls
- emergency exposure situations
- nuclear accident dosimetry
- records
- reports to individuals
- radiation safety training
- limits for the embryo/fetus

Organization and Administration

The RPP shall include plans, schedules, and other measures for achieving compliance with 10 CFR 835 (10 CFR 835.101(f)). Plans should include establishing the organization and administration of the RPP to ensure that the program is effectively implementing appropriate measures that ensure regulatory compliance can be achieved and sustained. The authority and responsibility for radiation protection should originate at the highest levels of line management and should be emphasized throughout the organization. Ultimately, workers should be aware of their individual responsibilities for radiation protection. Programmatic documentation should be developed to document the organizational and administrative aspects of the RPP.

The degree of formality and the scope of the associated administrative processes should be commensurate with the radiological hazards encountered and the complexity of the associated control measures. More rigorous administrative processes should be implemented for more complex or hazardous DOE activities. Administrative processes should include a hierarchy of documents that clearly and unambiguously delineate management policies, requirements, expectations, and objectives for the RPP. This documentation should typically include the following:

- Policy statement. The policy statement should articulate management's commitment to conduct radiological operations in a manner that will ensure the health and safety of all its employees, contractors, and the general public. This policy statement should be patterned after DOE P 441.1, *Department of Energy Radiological Health and Safety Policy.*
- Site-specific radiological control manual or handbook. This document should be issued and endorsed by senior management for a DOE activity. This manual or handbook should address all functional elements of the RPP for the DOE activity.
- Procedures. These documents should provide detailed instructions for implementing various functional elements of the RPP. Responsibilities and actions required of management and workers should be clearly and unambiguously stated. Written procedures shall be developed and implemented as necessary to ensure compliance with 10 CFR 835, commensurate with the radiological hazards created by the activity and consistent with the education, training, and skills of the individuals exposed to those hazards (10 CFR 835.104).

ALARA Program

In promulgating 10 CFR 835, DOE considered alternatives to reduce the risk from radiation exposure to workers that included retaining the current occupational dose limits, reducing these limits, and emphasizing efforts to maintain occupational doses as low as is reasonably achievable. After considering public comments on this issue, DOE elected to emphasize the ALARA process to maintain occupational dose for DOE and contractor employees well below the current regulatory occupational dose limits. Adopting the ALARA process in DOE occupational radiation protection regulations also provides consistency with recommendations provided in the President's *Radiation Protection Guidance to Federal Agencies for Occupational Exposure* which endorsed the ALARA process.

The importance of the ALARA concept was further stressed in DOE Policy P 441.1, *DOE Radiological Health and Safety Policy,* which states:

> It is the policy of the Department of Energy to conduct its radiological operations in a manner that ensures the health and safety of all its employees, contractors, and the general public. In achieving this objective, the Department shall ensure that radiation exposures to its workers and the public and releases of radioactivity to the environment are maintained below regulatory limits and deliberate efforts are taken to further reduce exposures and releases as low as reasonably achievable. The Department is fully committed to implementing a radiological control program of the highest quality that consistently reflects this policy.

Title 10 CFR 835 requires formal plans and measures for maintaining occupational exposures ALARA as part of the documented RPP. Measures include incorporating ALARA considerations into the design of new facilities and modifications of existing facilities, as well as activities that pose the potential for significant occupational dose. Additionally, administrative controls are addressed as measures that supplement physical design features and controls and are integrated into the work planning process. Record keeping and training requirements related to ALARA are also specified. DOE G 441.1-2, *Occupational ALARA Program Guide for use with Title 10, Code of Federal Regulations, Part 835, Occupational*

Radiation Protection, discusses acceptable methods for implementing the ALARA process provisions in 10 CFR 835.

Due to the complex nature of many DOE activities, a combination of radiological and non-radiological hazards may be encountered. Identification of nonradiological hazards is critical to the ALARA process, because efforts to apply the ALARA process may inadvertently increase risks from nonradiological hazards. An integrated safety management approach that optimizes worker protection from all hazards should be considered in the ALARA process for a given DOE activity.

External Dosimetry

Due to the types of material handled or processed, low-level, chronic occupational exposures to external ionizing radiation are difficult to avoid, necessitating an external dosimetry program at most DOE and DOE contractor facilities that use, handle, or store radioactive materials. An external dosimetry program generally consists of three elements:

- An area monitoring program, using an array of fixed and portable devices, as appropriate
- An individual monitoring program, using personnel dosimeters
- A dose evaluation program that evaluates the data collected by the area and individual monitoring programs to determine the magnitude of individual doses

Internal Dosimetry

Radiation protection programs for limiting intakes of radioactive material are based on the DOE policy of controlling radioactive material at the source. It is nonetheless recognized that low-level, chronic, or intermittent occupational exposures to some materials may be difficult to avoid due to the types of material handled or processed, their chemical or physical forms, and the nature of operations, and that incidents may cause unplanned releases of radioactive material. 10 CFR 835.402(c) requires internal dosimetry programs, including routine radiobioassay programs be conducted for radiological workers, declared pregnant workers, occupationally exposed minors, and members of the public entering controlled areas who are likely to receive intakes that exceed specified levels for committed effective dose equivalent in a year. An internal dosimetry program generally consists of three elements:

- An air monitoring program, using a combination of real-time, fixed, and portable devices, as appropriate
- An individual monitoring program, using direct and/or indirect radiobioassay, and personal breathing zone air monitoring, as appropriate
- A dose evaluation program that evaluates the data collected by the air and individual monitoring programs to determine the magnitude of individual doses

Area Monitoring and Control

Title 10 CFR 835.401 states the following requirements.

Monitoring of individuals and areas shall be performed to

- demonstrate compliance with the regulations in 10 CFR 835,
- document radiological conditions,
- detect changes in radiological conditions,
- detect the gradual buildup of radioactive material,

- verify the effectiveness of engineering and process controls in containing radioactive material and reducing radiation exposure, and
- identify and control potential sources of individual exposure to radiation and/or radioactive material.

Instruments and equipment used for monitoring shall be

- periodically maintained and calibrated on an established frequency;
- appropriate for the type(s), levels, and energies of the radiation(s) encountered;
- appropriate for existing environmental conditions; and
- routinely tested for operability.

Radiological Controls

Superior, consistent performance is achieved when qualified individuals use approved procedures and management actively monitors the workplace and assesses ongoing activities. Such ongoing activities include, but are not limited to, operations, remediation, laboratory work, research and development, and cleanup. Constant review and informed interest by senior management are required to achieve a superior radiological control program. Management at all levels should emphasize the need for high standards for radiological control through direct communication, instruction, and inspection of the work space. The DOE operations office manager and the contractor senior site executive responsible for the site should have a basic knowledge of radiation, its effects, and radiological control requirements. The DOE operations office manager and the contractor senior site executive should also be familiar with the current radiological control performance record. Key principles common in a successful, well-managed radiological control program are provided in DOE-STD-1098-99, *Radiological Control*.

Emergency Exposure Situations

A general employee whose occupational dose has exceeded the numerical value of any of the limits specified in 10 CFR 835.202 as a result of an authorized emergency exposure may be permitted to return to work in radiological areas during the current year providing that all of the following conditions are met:

- Approval is first obtained from the contractor management and the head of the responsible DOE field organization
- The individual receives counseling from radiological protection and medical personnel regarding the consequences of receiving additional occupational exposure during the year
- The affected employee agrees to return to radiological work

All doses exceeding the limits specified in 10 CFR 835.202 shall be recorded in the affected individual's occupational dose record.

When the conditions under which a dose was received in excess of the limits specified in 10 CFR 835.202, except those received in accordance with 10 CFR 835.204, have been eliminated, operating management shall notify the head of the responsible DOE field organization.

Operations after a dose was received in excess of the limits specified in 10 CFR 835.202, except those received in accordance with 10 CFR 835.204, may be resumed only with the approval of DOE.

Nuclear Accident Dosimetry

Installations possessing sufficient quantities of fissile material to potentially constitute a critical mass, such that the excessive exposure of individuals to radiation from a nuclear accident is possible, shall provide nuclear accident dosimetry for those individuals.

Nuclear accident dosimetry shall include all of the following:

- A method to conduct initial screening of individuals involved in a nuclear accident to determine whether significant exposures to radiation occurred
- Methods and equipment for analysis of biological materials
- A system of fixed nuclear accident dosimeter units
- Personal nuclear accident dosimeters

Records

DOE G 441.1-11, *Occupational Radiation Protection Record-Keeping and Reporting Guide for use with 10 CFR 835*, provides instructions for implementing a program that will meet DOE requirements for generating, administering, and retaining occupational radiation protection records and reports. Complete and accurate radiation protection records are necessary to

- provide information used to protect individuals from radiation exposure;
- evaluate the effectiveness of the radiation protection program;
- demonstrate compliance with regulations and requirements; and
- defend the radiation protection program against unwarranted litigation.

Supporting guidance useful in developing and implementing occupational radiation protection record-keeping programs is provided in ANSI standard N13.6, *American National Standard Practice for Radiation Exposure Records Systems* and NCRP Report No. 114, *Maintaining Radiation Protection Records*. These documents should be used in concert with DOE G 441.1-11 and 10 CFR 835 because they may not address every DOE-specific occupational radiation protection record-keeping requirement.

DOE-STD-1098-99, *Radiological Control,* provides detailed information concerning various aspects of records management programs, including record-keeping standards. The RCS provides detailed technical guidance concerning employee records, radiological control procedures, area monitoring, and instrumentation and control. The information provided by the RCS, used in conjunction with DOE G 441.1-11, will assure that a records management program will meet the record-keeping requirements and relevant DOE contractual requirements.

Reports to Individuals

Radiation exposure data for individuals monitored in accordance with 10 CFR 835.402 shall be reported as specified in 10 CFR 835 801. The information shall include the data required under 10 CFR 835.702(c). Each notification and report shall be in writing and include the

DOE site or facility name, the name of the individual, and the individual's social security number, employee number, or other unique identification number.

Upon the request from an individual terminating employment, records of exposure shall be provided to that individual as soon as the data are available, but not later than 90 days after termination. A written estimate of the radiation dose received by that employee based on available information shall be provided at the time of termination, if requested.

Each DOE- or DOE-contractor-operated site or facility shall, on an annual basis, provide a radiation dose report to each individual monitored during the year at that site or facility in accordance with 10 CFR 835.402.

Detailed information concerning any individual's exposure shall be made available to the individual upon request of that individual, consistent with the provisions of the Privacy Act (5 U.S.C. § 552a).

When a DOE contractor is required to report to the Department, pursuant to departmental requirements for occurrence reporting and processing, any exposure of an individual to radiation and/or radioactive material, or planned special exposure in accordance with 10 CFR 835.204(e), the contractor shall also provide that individual with a report on his or her exposure data included therein. Such report shall be transmitted at a time not later than the transmittal to the Department.

Radiation Safety Training

While there are significant differences in the missions of various DOE and DOE-contractor operations, and thus significant differences in the content of radiation safety training programs necessary for adequate protection of employees, the basics of radiation safety for DOE activities can be taught using core course material augmented by site-specific material.

Different levels of radiation safety training are used to ensure the safe and efficient conduct of work. Training courses, such as Radiological Worker Training take into account different levels of risk associated with various job functions and duty locations. Training shall be commensurate with the level of potential radiological hazards (10 CFR 835.901(c)).

A training program that evaluates the knowledge and skills that a worker needs for safe job performance, in conjunction with core course material for teaching the fundamentals of radiation safety, should be implemented to ensure that individuals can perform their assigned duties safely and respond appropriately to both normal and abnormal situations they may encounter.

Limits for the Embryo/Fetus

DOE has codified in 10 CFR 835.206 radiation dose limits for the embryo/fetus as a result of the occupational exposure of a declared pregnant worker. These requirements are established to provide protection to the embryo/fetus in a manner that does not discriminate against the rights of the pregnant worker.

Programs established to evaluate and control radiation dose to the embryo/fetus need to balance protection of the embryo/fetus (from hazards that may arise from the mother's

occupational radiation exposure) against the possibility of work discrimination against the mother. The choice of providing additional protection to the embryo/fetus is left entirely to the voluntary discretion of the mother. The Supreme Court ruled in United Automobile Workers v. Johnson Controls, Inc., 499 U.S.187, 206 that ". . . decisions about the welfare of future children must be left to the parents who conceive, bear, support, and raise them rather than to the employers who hire those parents."

Internal Audits

Internal audits and self assessments are two of the numerous checks and balances needed in an effective RPP. Internal audits of the RPP, including examination of program content and implementation, should be conducted through a process that ensures that all functional elements of the program are reviewed no less frequently than every 36 months.

An audit plan should be developed that identifies the functional elements of the RPP and the schedule for review to ensure that over a 36-month period, all of the functional elements are reviewed. Internal audits should be conducted on a continuing basis. DOE cautions against conducting a single comprehensive internal audit of the entire RPP once every 3 years. DOE does not believe that such an approach is effective in assuring that a DOE activity will be conducted in conformance with its approved RPP. DOE recommends that, at a minimum, an annual, broad scope audit of the program be conducted. Under this approach, the audit plan would identify each functional element to be reviewed during the annual audit and ensure that all functional elements would be reviewed during a 36-month cycle. Thus, the RPP is under continuing review, and deficiencies can be identified and corrected in a timely manner.

Internal audits should be conducted by individuals who are organizationally independent from the organizations responsible for developing and implementing the RPP.

e. Discuss the role of the following radiation protection policy, guide, and standard in establishing and maintaining a radiation protection program for a given DOE nuclear facility/activity:
- **DOE P 441.1, DOE Radiological Health and Safety Policy;**
- **DOE G 441.1-series; and**
- **DOE-STD-1098-99, Radiological Control.**

Each DOE nuclear facility/activity must conform to the above-referenced policy, guide, and standard in order to remain compliant with its radiation protection program. As the Guide is a multi-part series of directives, each chapter of the Guide is briefly described below.

DOE P 441.1, DOE Radiological Health and Safety Policy

The purpose of this directive is to establish DOE's Radiological Health and Safety Policy as a basis for the Department's radiological control programs. Its full text is found in element 22.a.

DOE G 441.1 Series

- DOE G 441.1-1A, *Management and Administration of Radiation Protection Programs Guide for Use with 10 CFR 835, Occupational Radiation Protection*

  This Guide discusses acceptable methods for ensuring that radiological activities will be managed and administered in accordance with a documented radiation protection program that complies with DOE requirements specified in 10 CFR 835.

- DOE G 441.1-2, *Occupational ALARA Program Guide for Use with 10 CFR 835, Occupational Radiation Protection*

  This Guide provides an acceptable methodology for establishing and operating an occupational ALARA program that will comply with DOE requirements specified in 10 CFR 835.

- DOE G 441.1-3A, *Internal Dosimetry Program Guide for Use with 10 CFR 835, Occupational Radiation Protection*

  This Guide provides an acceptable methodology for establishing and operating an internal dosimetry program that will comply with DOE requirements specified in 10 CFR 835.

- DOE G 441.1-4A, *External Dosimetry Program Guide for Use with 10 CFR 835, Occupational Radiation Protection*

  This Guide provides an acceptable methodology for establishing and operating an external dosimetry program that will comply with DOE requirements specified in 10 CFR 835.

- DOE G 441.1-5, *Radiation-Generating Devices Guide*

  This Guide provides an acceptable methodology for establishing and operating a radiation-generating devices (RGD) control program that will comply with DOE requirements specified in 10 CFR 835.

- DOE G 441.1-6, *Evaluation and Control of Radiation Dose to the Embryo/Fetus Guide for Use with 10 CFR 835, Occupational Radiation Protection*

  This Guide provides an acceptable methodology for establishing and operating a program to control fetal exposure to ionizing radiation and evaluate the resultant dose that will comply with DOE requirements specified in 10 CFR 835.

- DOE G 441.1-7, *Portable Monitoring Instrument Calibration Guide for Use with 10 CFR 835, Occupational Radiation Protection*

  This Guide provides an acceptable methodology for establishing and operating a program for selecting, calibrating, testing, and maintaining portable radiation monitoring instruments that will comply with DOE requirements specified in 10 CFR 835.

- DOE G 441.1-8, *Air Monitoring Guide for Use with 10 CFR 835, Occupational Radiation Protection*

  This Guide provides an acceptable methodology for establishing and operating an air monitoring program that will comply with DOE requirements specified in 10 CFR 835. For completeness, this Guide also cites guidance provided in DOE-STD-1098-99, *Radiological Control*.

- DOE G 441.1-9, *Radioactive Contamination Control Guide for Use with 10 CFR 835,* Occupational *Radiation Protection*

  This Guide provides an acceptable methodology for establishing and implementing a contamination control program that will comply with DOE requirements specified in 10 CFR 835.

- DOE G 441.1-10, *Posting and Labeling for Radiological Control Guide for Use with 10 CFR 835, Occupational Radiation Protection*

  This Guide provides an acceptable methodology for establishing and operating a radiological hazard posting and labeling program that will comply with DOE requirements specified in 10 CFR 835.

- DOE G 441.11, *Occupational Radiation Protection Record-Keeping and Reporting Guide for Use with 10 CFR 835, Occupational Radiation Protection*

  This Guide provides an acceptable methodology for establishing and operating an occupational radiation protection record-keeping and reporting program that will comply with DOE requirements specified in 10 CFR 835.

- DOE G 441.1-12, *Radiation Safety Training Guide for Use with 10 CFR 835, Occupational Radiation Protection*

  This Guide provides an acceptable methodology for establishing and operating a radiation safety training program that will comply with DOE requirements specified in 10 CFR 835.

- DOE G 441.1-13, *Sealed Radioactive Source Accountability and Control Guide*

  This Guide provides an acceptable methodology for establishing and operating a sealed radioactive source accountability and control program that will comply with DOE requirements specified in 10 CFR 835.

DOE-STD-1098-99, Radiological Control

This standard supplements the DOE G 441.1 series of guides and serves as a secondary source of guidance for achieving compliance with 10 CFR 835. While there is significant overlap between the DOE G 441.1 series of guides and this standard, this standard differs from the guides in intent and detail. In contrast to the macroscopic view adopted by the guides, this standard discusses specific measures that should be implemented by affected line managers, workers, and support staff to ensure proper fulfillment of their radiological control responsibilities. DOE expects that each site will identify the provisions of this standard that support its efforts to implement an effective radiological control program and incorporate

these provisions, as appropriate, into the site-specific radiological control manual, site procedures, training, or other administrative instruments that are used to guide employee activities. The specific administrative instruments used at DOE sites vary widely, as would be expected given the varying nature of DOE facilities and activities and their associated hazards.

f. Discuss the requirements delineated in DOE Order 5400.5, Radiation Protection of the Public and the Environment.

The following are highlights of the requirements in chapter 2 of DOE Order 5400.5.

Public Dose Limits

Dose limits for members of the public are presented in this chapter. The primary public dose limits include consideration of all exposure modes from all DOE activities, including remedial actions. The primary dose limit is expressed as an effective dose equivalent, a term developed by the International Commission on Radiological Protection for their risk-based system, which requires the weighted summation of doses to various organs of the body. Additional public dose limits are established by EPA regulations for exposures to several selected sources or exposure modes (pathways or conditions). Public dose limits promulgated by EPA for selected exposure modes are sometimes expressed as dose equivalents, which do not include risk-based weighting or summation of doses to various organs, and are sometimes expressed as effective dose equivalent. DOE must also comply with legally applicable requirements (e.g., 40 CFR 61, 191, and 192, and 10 CFR 60 and 72), including administrative and procedural requirements. Except for those provided in paragraph II.1a(4) of DOE Order 5400.5, administrative and procedural requirements of legally applicable regulations are not addressed in this Order. Such legally applicable regulations must be consulted for provisions not addressed in this Order.

The ALARA Process

Field elements should develop a program and require contractors to implement the ALARA process for all DOE activities and facilities that cause public doses.

ALARA requires judgment with respect to what is reasonably achievable. Factors that relate to societal, technological, economic, and other public policy considerations should be evaluated to the extent practicable in making such judgments.

Management and Control of Radioactive Materials in Liquid Discharges and Phaseout of Soil Columns

In addition to the requirement to limit dose to members of the public (onsite or offsite) in accordance with the standards established in paragraphs 11.1a and II.1d of DOE Order 5400.4, further controls are imposed on liquid releases to protect resources such as land, surface water, groundwater, and the related ecosystems from undue contamination. Derived concentration guides are not release limits, but rather are screening values for considering the best available technology for these discharges and for making dose estimates.

Management of Low-Level Radioactive Solid Waste

The requirements for the management of low-level wastes are presented in DOE [Order] 5400.1 and DOE [Order] 5820.2A. Design, operational, and monitoring requirements for disposal of solid low-level waste containing no constituents regulated by RCRA are addressed in DOE [Order] 5820.2A

Release of Property Having Residual Radioactive Material

Release of Real Property. Release of real property (land and structures) should be in accordance with the guidelines and requirements for residual radioactive material presented in chapter IV of DOE Order 5400.5. These guidelines and requirements apply to DOE-owned facilities and to private properties that are being prepared by DOE for release. Real properties owned by DOE that are being sold to the public are subject to the requirements of section 120(h) of CERCLA, as amended, concerning hazardous substances, and to any other applicable Federal, state, and local requirements. The requirements of 40 CFR 192 are applicable to properties remediated by DOE under the Uranium Mill Tailings Radiation Control Act.

Release of Personal Property. Personal property, which potentially could be contaminated, may be released for unrestricted use if the results of a survey with appropriate instruments indicate that the property is less than the contamination limits presented in figure IV-1 of DOE Order 5400.5.

Demonstration of Compliance with the Dose Limits

Compliance with the dose limits of DOE Order 5400.5 should be demonstrated by documentation of an appropriate combination of measurements and calculations to evaluate potential doses and the results of the evaluations.

Reporting Requirements

In addition to the reporting requirements of DOE 5400.1 and DOE 5484.1, the responsible DOE field office manager should notify, in a timely manner, the relevant program office(s) and the Deputy Assistant Secretary for Environment (EH-20) of actual or potential exposures of members of the public that could result in either (1) an effective dose equivalent from DOE sources exceeding 10 mrem (0.1 mSv) in a year, or (2) a dose exceeding any limit or not meeting any other requirement specified in DOE Order 5400.5 or any other legally applicable limits, or a combined dose equal to or greater than 100 mrem (1 mSv) effective dose equivalent in a year due to DOE and other man-made sources of radiation (medical, consumer products, and natural sources excepted). For purposes of determining compliance with the reporting requirements of 40 CFR 302 and 355, releases of source, by-product, and special nuclear material that occur from DOE activities are considered to be "Federally permitted" releases if they do not exceed the limits specified in DOE Order 5400.5 and the operations and releases are in compliance with DOE policies, and guidelines, and requirements specified in DOE Orders, including DOE Order 5820.2A.

Records

The content and retention of records is as follows:

- Content. Records developed should include information and the data necessary to identify and characterize releases of radioactive material to the environment, their fate

in the environment, and their probable impact on radiation doses to the public. Basic information used to assess compliance with the requirements of DOE Order 5400.5 pursuant to paragraph 11.6, and the results of such assessments, should be incorporated as part of the record.

- Retention. Information and data developed pursuant to DOE Order 5400.5 should be retained consistent with the requirements of DOE Order 1324.2A and other legally applicable requirements.

Units

All reports, notifications, and records developed pursuant to DOE Order requirements should present data in the units used in the applicable regulation or DOE Order.

Mandatory Performance Activities (perform either a or b):

a. Conduct an assessment of the radiation protection program at a given site/facility and report the results to DOE management.

b. Review a radiation protection program assessment for a DOE nuclear facility/activity; evaluate proposed corrective actions and discuss the results of the review with the DOE radiation protection program subject matter expert.

Note: The mandatory performance activities listed in elements a and b are performance based. The Qualifying Official will evaluate their completion.

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Appendix A –
Root Causal Codes

Category	Code Description
Equipment/Material Problem	
1A	Defective or failed part
1B	Defective or failed material
1C	Defective weld, braze, or soldered joint
1D	Electrical or instrument notice
1E	Contamination
Procedure Problem	
2A	Defective or inadequate procedure
2B	Lack of procedure
Personnel Error	
3A	Inadequate work environment
3B	Inattention to detail
3C	Violation of requirement or procedure
3D	Verbal communication problem
3E	Other human error
Design Problem	
4A	Inadequate man-machine interface
4B	Inadequate or defective design
4C	Error in equipment or material selection
4D	Drawing, specification, or data error
Training Deficiency	
5A	No training provided
5B	Insufficient practice or hands-on experience
5C	Inadequate content
5D	Insufficient refresher training
5E	Inadequate presentation or materials
Management Problem	
6A	Inadequate administrative control
6B	Work organization/planning deficiency
6C	Inadequate supervision
6D	Improper resource allocation
6E	Policy not adequately defined, disseminated, or enforced
6F	Other management problem
External Phenomenon	
7A	Weather or ambient condition
7B	Power failure or transient
7C	External fire or explosion
7D	Theft, tampering, sabotage, or vandalism

Source: DOE-NE-STD-1004-94

Appendix B –
Accident Type Comparison

Categorization Type	Type A	Type B
Human Effects	(1) Any injury or chemical or biological exposure that results in, or is likely to result in the fatality of an employee or member of the public (fatal injury is defined as any injury that results in death within 30 calendar days of the accident; see 49 CFR 830.2). (2) Any accident where three or more DOE, contractor, or subcontractor employees, or members of the public incur a serious injury (as defined in 49 CFR 830.2) that requires hospitalization for more than 48 hours, commencing within 7 calendar days from the date the injury was received; results in severe hemorrhages; results in severe damage to nerves, muscles, tendons, or internal organs; results in second or third degree burns affecting more than 9 percent of the body surface; or has a high probability of realizing a permanent total disability due to injuries, chemical exposures, or biological exposures received. (3) A single individual radiation exposure (see 10 CFR 835.202, Occupational Exposure Limits for General Employees) resulting in: (a) A total effective dose equivalent of 25 rem or more; (b) A dose equivalent to	(1) Any accident that results in the hospitalization of one or more DOE, contractor, subcontractor employees or members of the public for five continuous calendar days or longer due to serious injury (as defined in 49 CFR 830.2), occupational illness (except members of the public), chemical exposure, or biological exposure. (2) Any one accident resulting in five or more lost-workday cases. (3) A series of accidents involving five or more lost-workday cases occurring within a one-year time period that involve identical or similar facilities, systems, equipment, materials, or procedures. This criterion is intended to cover injuries, illnesses, and exposures that reveal a pattern and cause for (4) A single radiation exposure to an individual that results in: (a) A total effective dose equivalent of at least 10 rem but less than 25 rem; (b) A dose equivalent to the lens of the eye of at least 30 rem but less

Categorization Type	Type A	Type B
	the lens of the eye of 75 rem or more; (c) A shallow dose equivalent to an extremity or skin of 250 rem or more; (d) The sum of the deep dose equivalent for external exposure and the committed dose equivalent to any organ or tissue other than the lens of the eye of 250 rem or more; or (e) A dose equivalent to the embryo or fetus of a declared pregnant worker of 2.5 rem or more.	than 75 rem; (c) A shallow dose equivalent to an extremity or skin of at least 100 rem but less than 250 rem (d) The sum of the deep dose equivalent for external exposure and the committed dose equivalent to any organ or tissue other than the lens of the eye of at least 100 rem but, less than 250 rem; or (e) A dose equivalent to the embryo or fetus of a declared pregnant worker of at least 1 rem but less than 2.5 rem.
Environmental Effects	Release of a hazardous substance, material, waste, or radionuclide from a DOE facility (onsite or offsite), in an amount greater than five times the reportable quantities specified in 40 CFR Part 302, that results in serious environmental damage.	Release of a hazardous substance, material, waste, or radionuclide from a DOE facility (onsite or offsite), in an amount equal to or greater than two times but less than five times the reportable quantities specified in 40 CFR Part 302, that results in serious environmental damage.
Property Effects	(1) Estimated loss of, or damage to, DOE or other property, including aircraft damage equal to or greater than $2.5 million or requiring estimated costs equal to or greater than $2.5 million for cleaning, decontaminating, renovating, replacing, or rehabilitating structures, equipment, or property. (2) Any apparent loss, explosion	(1) Estimated loss of, or damage to, DOE or other property of less than $2.5 million but more than $1 million, including aircraft damage, and costs of cleaning, decontaminating, renovating, replacing, or rehabilitating structures, equipment, or property. (2) The operation of a nuclear

Categorization Type	Type A	Type B
	or theft involving radioactive or hazardous material under the control of DOE, contractors, or subcontractors in such quantities and under such circumstances to constitute a hazard to human health and safety or private property. (3) Any unplanned nuclear criticality.	facility beyond its authorized limits resulting in the consequences identified in paragraphs 2, 3, or 4 of this attachment.
Other Effects	Accidents Requiring Type A Investigations. Any accident or series of accidents for which a Type A investigation is deemed appropriate by the Secretary or the Assistant Secretary for Environment, Safety and Health.	Any accident or series of accidents for which a Type B investigation is deemed appropriate by the Secretary; Assistant Secretary for Environment, Safety and Health; Associate Deputy Secretary for Field Management; Cognizant Secretarial Officer; or Head of the Field Element. This includes, for example, Departmental cross-cutting issues and issues warranting the attention of local news or interest groups.

Source: DOE G 225.1A-1

Senior Technical Safety Manager
Qualification Standard
Reference Guide
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